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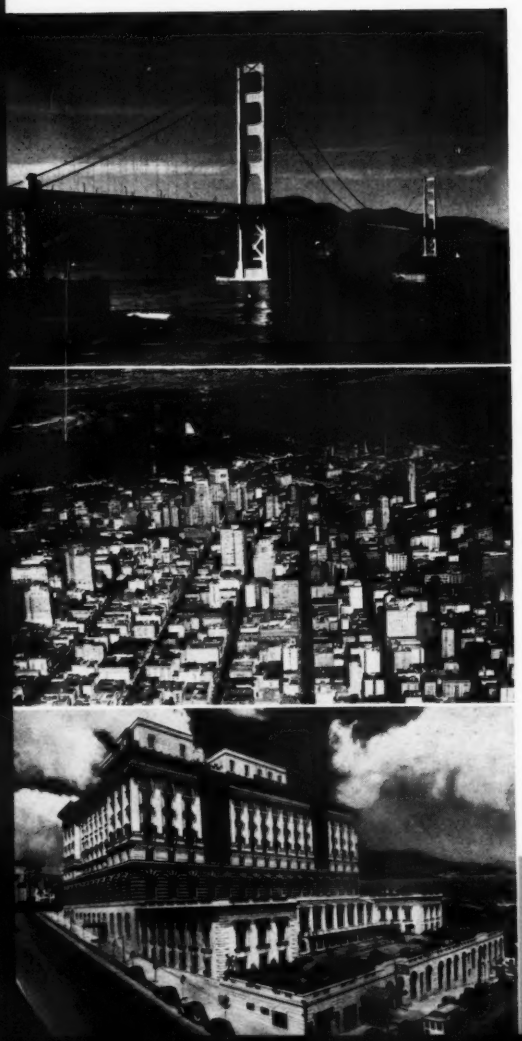

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MINING CONGRESS JOURNAL

Vol. 27 JUNE, 1941 No. 6

The hot season is upon us. Washington is a hotter spot than usual as defense strikes, taxes, priorities, and other vital matters absorb attention. The ponderous machinery of government accelerates to war tempo, and at the same time seeks to streamline itself to the demands of modern lightning methods.

Changes in the Excess Profits Tax are under consideration. In this issue H. B. Fernald discusses the needs of the mining industry, and points out that the provisions of the Excess Profits Tax must not be applied to normal profits, thereby shutting off the flow of "venture capital" into mine exploration and development.

There is much enlightenment and food for thought in the many features of this issue. Read them all.

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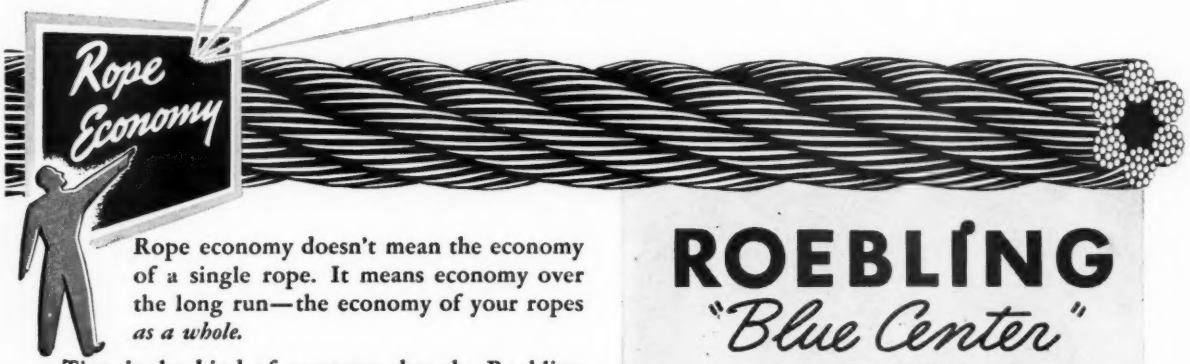

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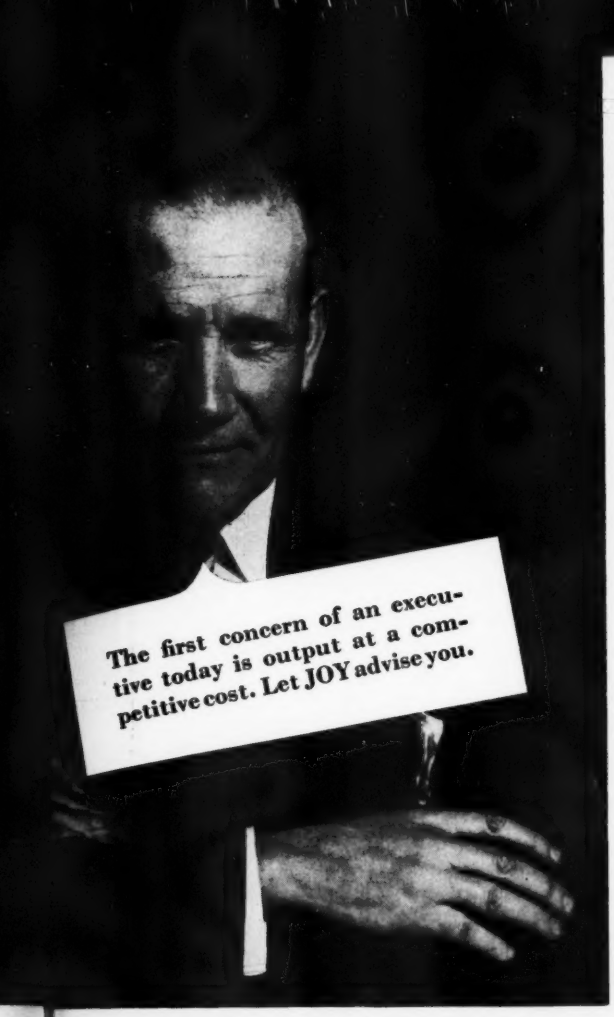

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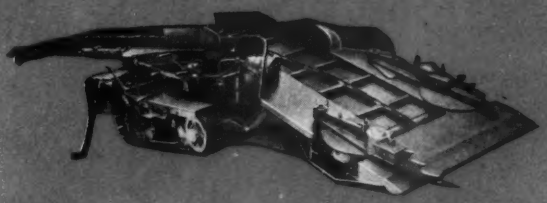

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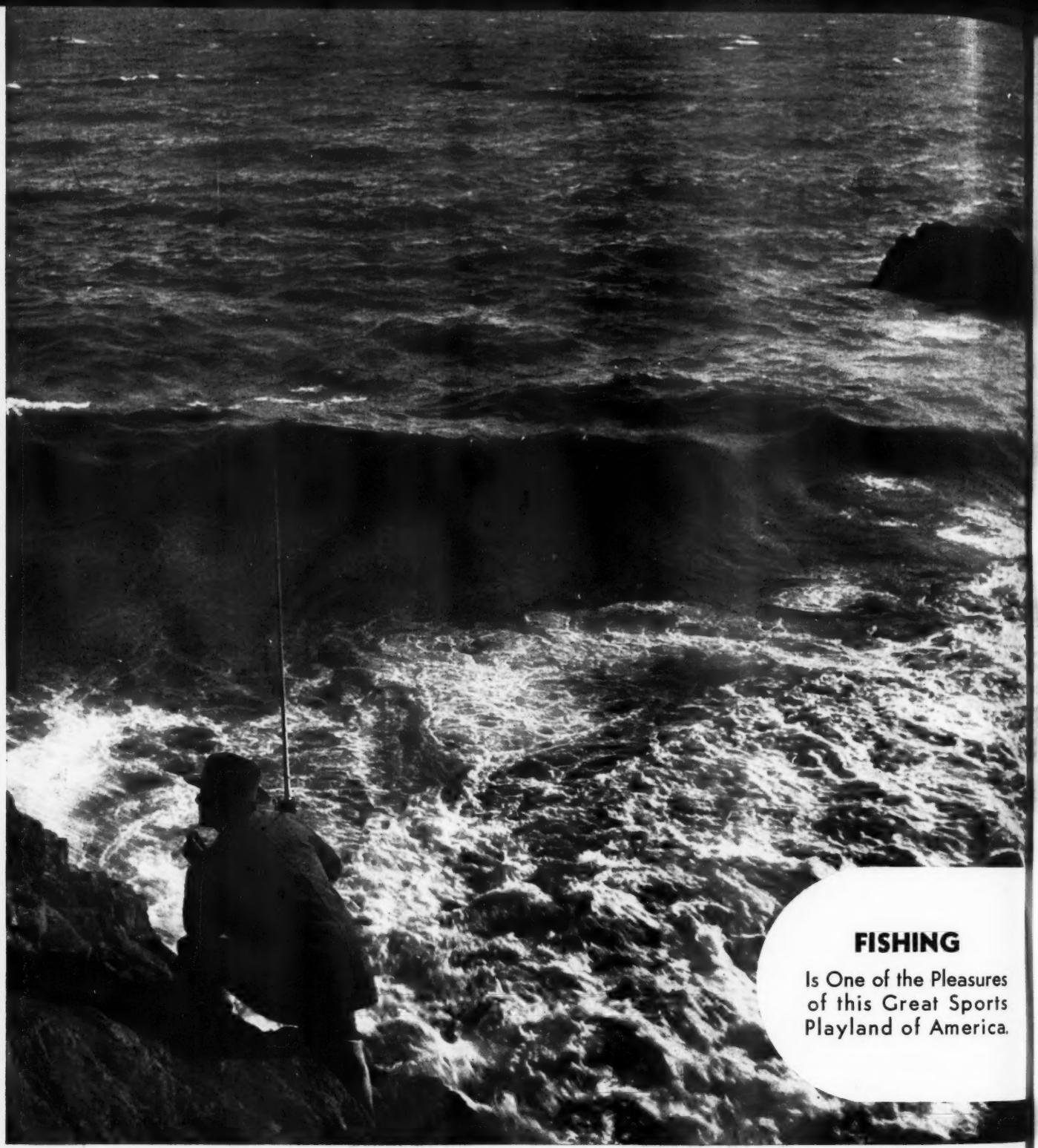

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A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

RUSSELL C. FLEMING
Editor

Vol. 27 JUNE, 1941 No. 6

THE FLOW OF FUEL

THE wheels of industry, turning ever faster, depend on coal to keep them speeding; coal in turn largely depends on the wheels of the railroads for transportation to the points of consumption. A task of great magnitude and of paramount importance is faced by the railroads in handling the vast bulk of traffic, including coal, that must be moved to keep all parts of the country supplied with necessary materials.

Ralph Budd, Transportation Commissioner, Advisory Commission to the Council of National Defense, in his address on May 1 at the Annual Coal Convention of the American Mining Congress at Cincinnati, analyzed the situation the railroads must now be prepared to meet. He pointed out that advance estimates predict an increase this year of 9 to 12 percent in railroad carloadings over last year, and that the normal peak of railroad traffic comes in the fall when movements of crops and of coal are heaviest. These advance estimates were made before the coal strike in April; as a consequence of the strike the movement for that month was less than predicted. This deficiency must be made up during the coming months.

In the discussion which followed, the importance of heavier-than-normal stocking of coal during the slack season was brought to the attention of Mr. Budd by Charles Dorrance, President of the West Virginia Coal and Coke Company. Mr. Dorrance called special attention to the excellent summation of this situation made by James D. Francis, President of the Island Creek Coal Company, in his annual report to stockholders for 1940, as follows:

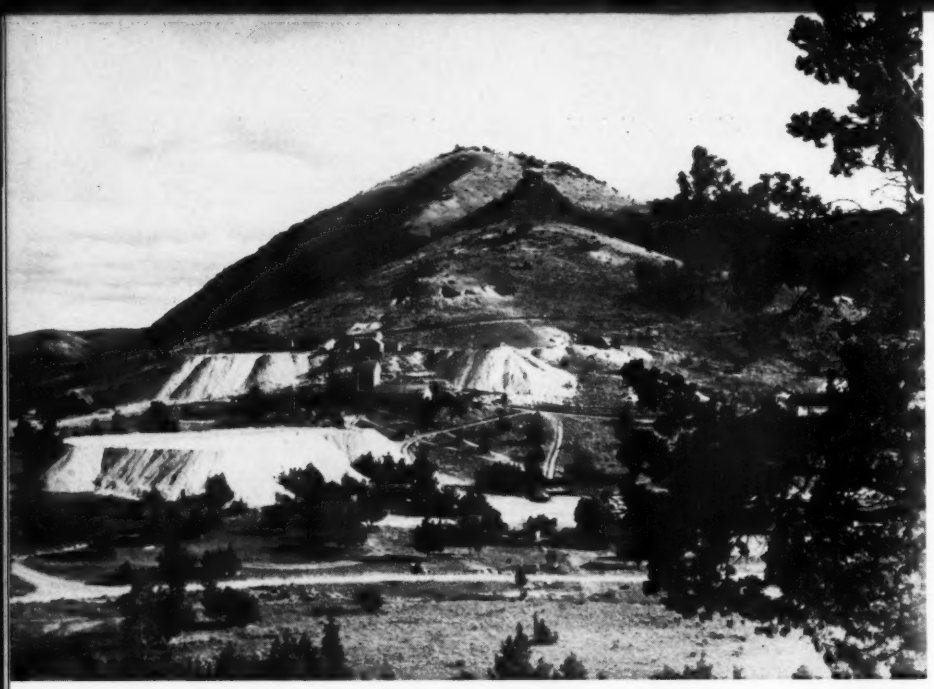
> "Your management considers it of importance, not only to industry but to the nation as a whole, that further increase be made in the stocks of coal above ground during the spring and early summer of 1941, that industries be encouraged to increase their stocks, and that retail dealers and householders put in more than a normal supply of coal during the spring and summer non-burning domestic season as an insurance against labor shortages, interruption of transportation, or other interferences with the coal supply which may occur during the fall and winter of 1941 and 1942. If the index of industrial production increases from 130 to 160 during the year, as is estimated by some economists, the burden on the labor and transportation facilities of the country will be very great. This burden can be relieved materially if governmental, industrial, and domestic consumers will add some 25 or 30 million tons to the normal storage as of August 1 before the heavy fall demand for coal and transportation is reached."

At the time the strike started on April 1, there were in the hands of consumers and retail coal dealers about fifty and a half million tons of coal. Owing to the strike, these stocks were reduced by the first of May to about thirteen and a half million tons. To insure against shortage this coming winter, it is estimated that there should be in the hands of industrial plants, retailers and domestic consumers by fall a minimum of 50,000,000 tons. In order to make up for the deficiency which occurred during the strike and to build up stocks to that figure, it will be necessary to add more than 36,000,000 tons to the present stocks in the coming months. Consumption in the same period is expected to be about 206,000,000 tons. To care for current consumption and build up stocks at the same time, it will therefore be necessary to produce and transport before October 1, 243,000,000 tons, or approximately 11,500,000 tons per week from the first of May to the first of October.

Measures have already been taken. On May 23 Mr. Budd addressed a letter to the President of the Association of American Railroads, quoting a resolution of the National Defense Advisory Commission urging that all coal users and dealers order and store as much coal as practicable between now and the first of October. The railroads themselves are advised to take action by building up stocks and company fuel during the summer months, and by having freight agents, freight solicitors and others who may come in contact with coal receivers, urge that such receivers build up their stocks in a similar manner.

Further, the Consumers Counsel created under the National Bituminous Coal Act as extended, with the endorsement of the OPM and other defense agencies, has publicly urged both industrial and domestic consumers to purchase at this time, to the extent of their available storage space, as much of the coal needed for next winter as possible. The Counsel states that "Summer buying and storage of coal are advocated as a direct and substantial aid to national defense . . . ." The appeal to consumers will be emphasized by the press, radio, posters and the cooperation of local defense councils. The National Coal Association, Appalachian Coals, Inc., and many other organizations have entered the campaign energetically.

Prompt and concerted action by producers, carriers, distributors, retailers and consumers of coal can aid greatly in averting a serious transportation congestion next fall and winter. These coal stocks must be built up in the coming months to free the railroads as much as possible for the carrying of other materials next fall. Otherwise, a fuel "blackout" may occur in industry and households may have "heatless" days or weeks. All stockpiles and coal bins should be full before the end of September. Do your part and urge your associates to do likewise.



GENERAL VIEW OF SURFACE PLANT

Furnace building in center, waste dump at left, lower grade dump at right, and calcine dump at lower left.

THE HORSE HEAVEN MERCURY MINE*

By LLOYD W. STAPLES
Chief Geologist
Horse Heaven Mines, Inc.

Before the defense effort started, the domestic production of mercury was only about 40% of requirements. The Bureau of Mines recently reported that domestic production in March was about 3,500 flasks while consumption was 4,000 flasks. In succeeding months the mercury mines will no doubt be able to meet domestic demands for this commodity so vitally needed in munitions and for other uses.

The mining operations described in this article have been built up in recent years to an efficient producing unit and are aiding materially in attaining this happy result.

THERE has been a great increase in interest in mercury mining due to the important role of the metal as one of the nine strategic minerals. Many new prospects are being developed, old mines reopened, and the more constant producers are running at capacity in an effort to supply all domestic requirements and maintain a small exportable surplus to be distributed as the government permits. Because the Horse Heaven mine is an example of a modern efficient mercury mine, with typical geology, development, and mining and furnacing methods, a description of these features will be given.

Located in Central Oregon

Horse Heaven mine is situated in central Oregon, in Jefferson County, about 45 miles east of Madras. To the east of the mine is Cherry Creek and the John Day Valley, to the south are the Ochoco Mountains, and to the west are the high Cascades. The mine elevation is about 3,500 ft. The region is arid, with no timber and only sagebrush and juniper as covering for the steep rolling hills.

As has been the case with many mercury mines, the first prospecting depended on panning cinnabar, and this ultimately led to the discovery of ore in place. A pan in the skillful hands of Art Champion directed the search from Cherry Creek, up the east slope of Horse Heaven Mountain and finally to the mine's present location. This was in April, 1933.

Early in 1934 underground development was started and this gave sufficient promise so that a 20-ton Nichols-Herreshoff furnace was installed by September of that year. A period of difficulty followed when it was found that less ore was immediately available than had been anticipated. Later it became evident that there were ample reserves of good ore, and the present owners, Horse Heaven Mines, Inc., controlled by Sun Oil Co., took over the property in September, 1936, after a six-month option period. Since that date consistent production has been maintained and

* Published by permission of S. H. Williston, Vice President, Horse Heaven Mines, Inc.

large blocks of new ground have yielded rich ore bodies.

Horse Heaven Mines, Inc., now has its offices in Portland, Ore., and the company is under the direction of J. Edgar Pew, president; S. H. Williston, vice president in charge of operations; and E. E. Gardanier, manager. F. E. Lewis is mine superintendent. Besides operating the Horse Heaven mine, the company is also engaged in developing several other properties.

Geology is Complex

The geology of quicksilver mineralization is usually complex and Horse Heaven is no exception to this rule. The mine is located in a region of tuff, basalt, rhyolite, agglomerate and obsidian, all badly distorted, intruded and altered. Locally the rocks belong to the Clarno formation of Eocene age. The Clarno is overlain by the John Day formation, which in the past has yielded valuable vertebrate material to paleontologists, and these beds in turn are capped by the Columbia River basalt formation of Miocene age.

The principal formations in the mine are tuffs, clays, and basalts. Most of the tuff has undergone one of two types of alteration, either silicification, or kaolinization. Cinnabar is found in both types. The tuffs have been intruded by basalt, and it is certain that the introduction of the cinnabar was subsequent to the intrusion of the basalt masses.

As is the case in most quicksilver deposits, structural features have played a very important part in the concentration of the cinnabar. The principal structural feature is the Horse Heaven fault, which runs northwest-southeast and dips about 45° to the southwest. The fault is pre-mineral, and quite variable both in dip and strike, so that following it has resulted in many wavy drifts and irregular stopes. The Horse Heaven fault is just as strong on the lowest level of the mine as it is on the top level. Workings have now paralleled it for over 1,000 ft.

In addition to the Horse Heaven fault there are several less important faults that have acted as caps and produced ore bodies. The ideal situation for the production of an ore body in the mine is a place where there is a body of tuff overlying a basalt intrusion and underlying a fault with a thick clay gouge. In such a case it is often found that the basalt, especially toward its margins, will be somewhat altered and contain fairly distinct veins of cinnabar, usually accompanied by considerable marcasite. This produces a low-grade area. At the contact with tuff there may be a fairly rich zone. The tuff is the best host rock in the mine and it is likely to be mineralized throughout, not in distinct veins as in the case of the basalt, but by an almost microscopic stockwork of minute quartz - cinnabar stringers. The richest values in the tuff are found at its upper margin below the heavy clay capping, especially where the fault flattens. It is interesting to note that often the richest cinnabar will be 5 to 10 ft. under the fault contact rather than immediately against it, although the latter occurrence is also common.

Horse Heaven Fault underground clay gouge on right, silicified tuff on left with stringers of cinnabar in it

All exploration work underground has been guided by a knowledge of the general structural relationships. Since the most important structure, the Horse Heaven fault, has a northwest-southeast strike, it was assumed that extension of the ore body would be in these directions. This has proven true. Likewise, successful exploration was aided by driving for places where it was known that good cappings could be obtained over tuff shells at the margins of basalt masses.

Cinnabar being an epithermal mineral, continuation of mineralization in depth is uncertain. Horse Heaven is now about 300 ft. in depth, from the highest to the lowest workings. The grade of the ore in the bottom levels is as good as at any other place, and there is reasonable expectation that it will continue downward.

Native quicksilver is found in many parts of the mine and has no relationship to depth. Small amounts of calomel and metacinnabar have also been found but, other than cinnabar, the only common metallic mineral present is marcasite. The lack of other non-silicate minerals makes furnacing a simple problem and yields a pure product.

Camp Facilities Provided

The camp at Horse Heaven is composed of numerous small buildings rather than one or two large bunkhouses. There are individual company-owned houses for the manager, superintendent, mill foreman, and technical staff. Many of the miners and other workers have built small houses of their own.

Drinking water is piped from two springs about a mile and a half from the camp. Mine water is used in the mill for washdowns and in the mine for drilling. In case of shortage of water in the camp, mine, or mill, the supply is augmented with water from a well.

The mine is served with mail twice weekly from its own post office, with the mailing address of Horse Heaven, Ore.

Mining Irregular Ore Bodies

Because of the nature of its deposition, giving rise to spotty, irregular, disconnected ore bodies, the mining of quicksilver is naturally more expensive than for bodies of greater regularity and larger size. Following the ore produces winding drifts, very irregular stopes, and a mine full of pockets. The resulting workings for most quicksilver properties is some-

thing of a labyrinth, but this is inevitable.

As has been mentioned, the ore at Horse Heaven occurs in silicified tuff, clays, and both hard and soft basalt. The wide variety of rock types requires drilling both with auger and jackhammer.

The workings at present consist of nine levels. These are irregularly spaced but average about 25 ft. between levels. The No. 6 level has been the main haulage level and it is to this level that ore is drawn in chutes from the stopes on the upper levels. Three-quarter ton cars filled on No. 6 level are hoisted on a 33° incline by an electric hoist to the No. 1 level, from which they are pushed 200 ft. to the crusher grizzly.

The development on No. 7, No. 8, and No. 9 levels has been by sinking from No. 6 level. This work indicates an ore body of importance and the mining method to be used in its removal will depend on what further information can be gained regarding its size and shape. The orebody lies under the Horse Heaven fault and in places it is fairly flat, due to irregularities in the dip of the fault.

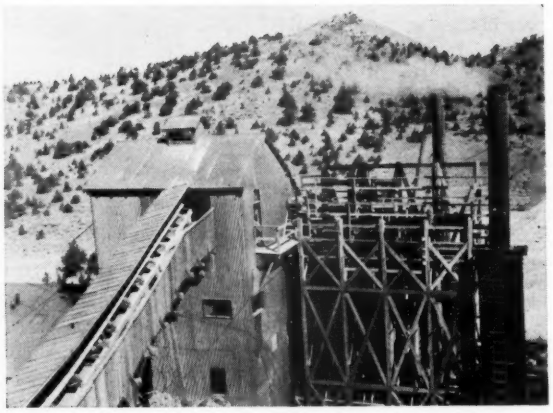
Whenever it has been feasible, the mining at Horse Heaven has been done by shrinkage stoping. This was the method used in No. 1 stope, which is the largest stope in the mine. The back of the stope is formed by a flattening of the Horse Heaven fault at about No. 2 level. The ore was drawn off through grizzlies on No. 5 level and taken out of two chutes on No. 6 level. At one time No. 1 stope had 5,000 tons of broken ore in it and represented valuable storage space. This stope was very high grade and averaged about 30 lbs. of mercury to the ton of ore.

In those parts of the mine where the rock is predominantly tuff, no timbering is needed. However, in the clay portions of the mine square-set stopes are necessary. The largest of these is 16 sets high.

During the first three years of the operation the mine production was only 20 tons per day. In order to keep production high, and since the ore was quite rich, anything under 10 lbs. per ton of mercury was put on the low-grade dump. This built up a valuable stockpile which has yielded considerable profit at the increased price of quicksilver.

Improved Furnace Practice

During the past year and a half the furnace arrangement at Horse Heaven has been greatly improved. The original furnace was a 20-ton Nichols-Herreshoff four-hearth furnace, with the usual Sirocco dust collector, surge tank, and cast-iron condensing system, consisting of two rows of 12-8 in. diameter tubes. Ore was trammed to the furnace by hand in ¾-ton mine cars, after going through the Blake jaw crusher. At present the crushed ore is fed to a 12-in. conveyor belt leading to the furnace feed bin of 20 tons capacity, thence to the top drying hearth of the furnace. The 20-ton furnace has had two additional hearths added, giving six sealed hearths and one upper drying hearth.

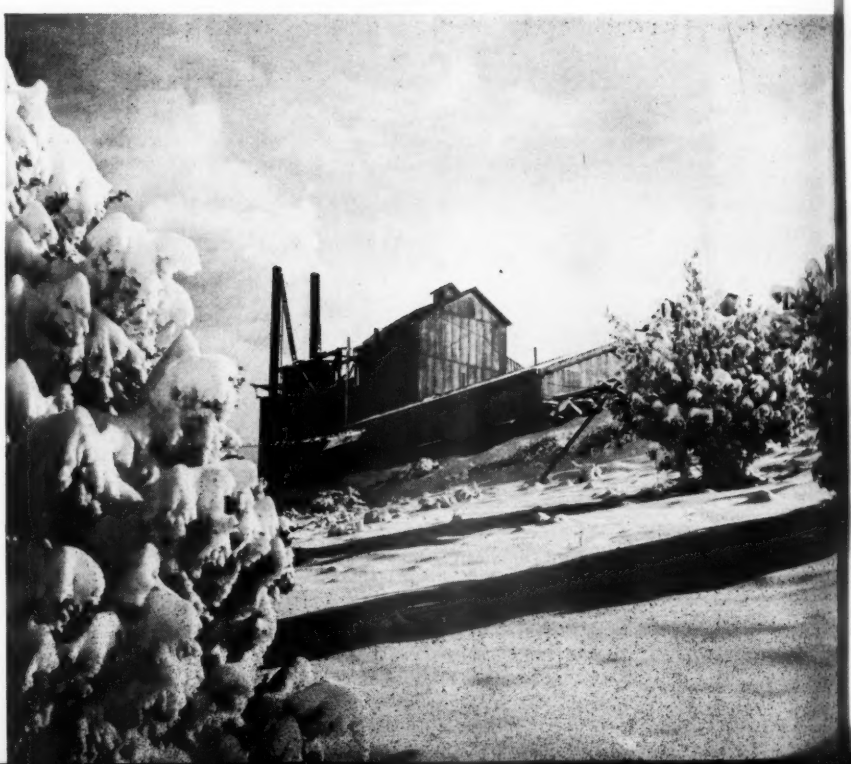


Conveyor gallery, furnace, building and condensing system

Whereas formerly there were pressure oil burners on the two bottom hearths only, there are now two additional burners, resulting in one on the third, two on the fifth, and one on the bottom hearth. This gives running temperature of about 600° F. on the No. 1 hearth and 1,600° on the bottom hearth. Although the present furnace is rated by Pacific Foundry Co., Ltd., San Francisco, Calif., builder of the Nichols-Herreshoff furnace, as a 30-ton unit, it has been found that this capacity can easily be exceeded and a maximum of 70 tons per day of ore can be handled. The capacity of the furnace depends on several variables, such as rock type, grade of ore, and moisture content, but a good average maintained over a long period is 50 to 55 tons per day.

Heat economy is obtained by circulating hot air from the calcine pit over the drying hearth of the furnace, thus preheating the ore and removing some of the excess moisture. As is the standard practice, heated air from the column and rabble arms is used with the oil-burner sprays. Oil for the furnace is transported from

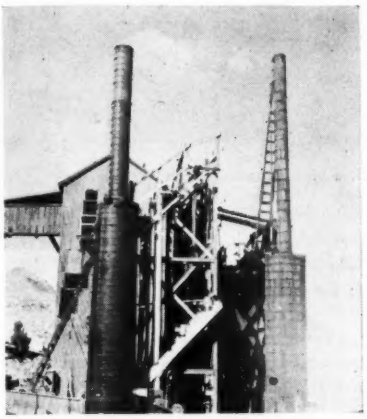
Winter at Horse Heaven



Portland by truck, and the average mill consumption of Diesel oil is about 600 gals. per day, including that for electric power and compressed air.

A useful innovation on the furnace is a variable-speed rheostat on the rabble-arm drive. This regulates the speed at which ore passes through the furnace, and can be set to give the optimum results with wet or dry ore.

The condensing system has also been changed so that a large volume of gases can be handled. In place of



Condensing system

cast-iron pipes, 15 black iron and 36 chrome-nickel-molybdenum stainless 9-in. diameter steel pipes are used, and these are arranged in rows of six, each row emptying into a single pot. The temperature of the first tube is about 350° F., while the exit temperature for the last tube is 90° to 120°, depending on atmospheric temperature. A fan is placed at the end of the tubes, just before the gases enter the wooden baffle and stack. This fan creates a vacuum in the condensers of about 8 in. of water at the fan end and pulls from 0.05 to 0.1 in. vacuum at the furnace.

It has been found economical to install a single D tube retort to handle the mud after it has been tabled. This results in a considerable saving of time in table-working the mud, since it is unnecessary to remove the last traces of quicksilver.

The electric power for the furnace, mine, and camp is generated by a 95-hp. caterpillar Diesel. A second similar unit drives the compressor. In case of a shutdown of either Diesel, the other one can be belted across to supply power for both units simultaneously.

A head sample of furnace ore is taken off the conveyor belt just before it dumps into the furnace hopper. This sampler has a rubber paddle that makes a clean sweep across the belt about seven times in a complete rotation of the belt. The sample is swept into a tube which splits the sample and gives a second portion for use as a check. The sampler is driven by gearing from the head conveyor pulley.

Technical Studies Aid Production

In order to keep the mine and mill working at maximum efficiency, the company has favored devoting considerable time to experimentation, testing, and checking. When apparatus has not been available to do this, the equipment has been designed and made up in the company shops.

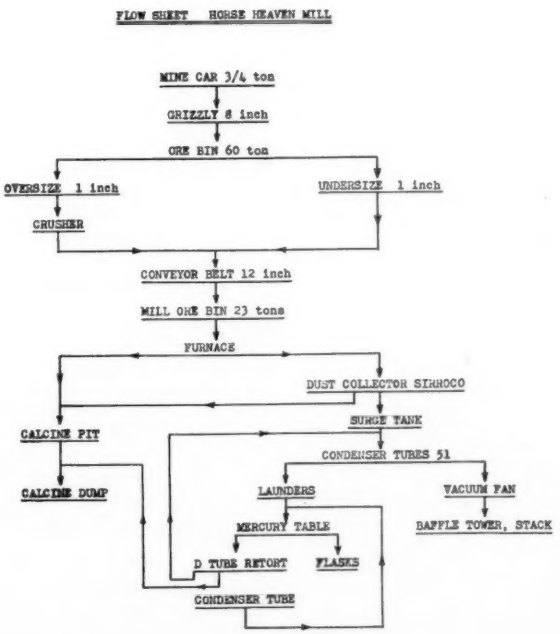
The gases entering and leaving the condensing system are analyzed for CO_2, CO, and O_2 daily. This gives a guide to the completeness of the roasting process, and the amount of leakage in the condensing system.

For mercury losses, a three-fold check is made. In the furnace building a General Electric selenium-paper mercury detector is used to note any gas escaping from the furnace. Since the furnace operates under a vacuum, losses from this source are rare. Vapor concentration is kept below one part of mercury in one hundred million parts of air. The other two danger points are stack losses, and losses

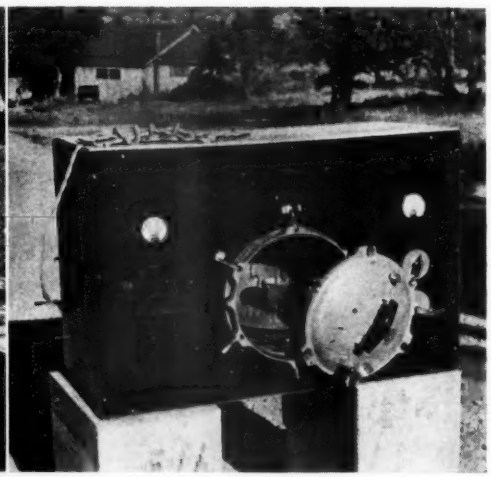
Exhaust fan, baffle tower, and stainless steel condensing tubes

from the calcine due to incomplete burning. Both of these are checked with equipment designed and built under the direction of S. H. Williston.

For checking and assaying calcines, as well as for general-duty assaying of all ores, an ultra-violet absorption chamber equipped with an electric eye is used. In this compact piece of equipment there is a heat chamber in which the charge is placed. After an electric light, connected with a



Orsat determination of gases in exhaust system at end of condensers



Ultra violet spectrometer for use in assaying

thermocouple, indicates the temperature of the chamber is above the volatilization temperature of cinnabar, a measured quantity of the gas is drawn out into a small chamber with quartz windows. Ultra-violet radiation (mercury - 2537 A. U.) passes through this chamber and onto an ultra-violet sensitive photo-cell. Depending upon the amount of mercury in the gas, there will be different degrees of absorption of the ultra-violet light. The intensity is measured by a potassium photo-cell actuating a microammeter set in the face of the apparatus. This meter can be standardized to read pounds per ton, or compared with its connected calibration chart.

For measurement of the amount of mercury in the stack gases there is used a piece of equipment (familiarly called a "sniffer") similar to that last described, but calibrated in micro pounds per cubic foot and connected directly with the stack.

Another piece of equipment, designed, constructed and used at Horse Heaven is a resistivity outfit for electrical prospecting. The method used is a modified split Wenner developed by Mr. Williston. It has outlined the Horse Heaven structure very well, and it is now being used in structural studies at the Cordero mine in Nevada, a sister corporation of Horse Heaven Mines, Inc.

Exploration Aided by Diamond Drilling

Both surface and underground diamond drilling have been used to aid exploration at Horse Heaven. The surface drilling was done during the early development of the property, but underground diamond drilling is still being used. For this work a Sullivan No. 12 oil hydraulic feed rig is used. Both AX and BX core is obtained, with preference being shown for BX when it is possible to obtain it.

Because cinnabar tends to occur in irregular patches, it is debatable whether diamond drilling for ore alone is more economical than drifting. It is believed that where an attempt is being made to work out the large geological structures which control ore deposition, diamond drilling pays for itself, especially where long trams or hoists are required. This has been its use at Horse Heaven where over 60 holes have been drilled. It should also be pointed out that because the value of any diamond-drilling program depends on interpretation of the results obtained, all work should be carefully laid out in advance and interpreted by a competent staff. This is equally true of geophysical work. Structural studies are very important in quicksilver exploration, and both the diamond drill and geophysical equipment have had their greatest successes in structural determinations. Consequently, these aids can be of great value in quicksilver work, under proper supervision.

Manganese Pilot Plant In Arizona

The M. A. Hanna Company, Cleveland, Ohio, is reported as planning to construct a small pilot mill to experiment with methods of concentration of manganese ore from the Artillery Peak district in Arizona. The company holds a long-term lease on this area, and on which the United States Bureau of Mines has been conducting exploratory and development work. The Bureau has already reported a large amount of low-grade manganese ore as available in the district, and exploitation awaits only the completion of a satisfactory and economic method of concentration. The Bureau has been conducting tests at Boulder City on 2,500 tons of this ore, seeking such a method, and the plant to be erected by the Hanna Company will complement and complete the work of the Bureau.

Deepening Idaho Shaft

Coeur d'Alene Mines Company in the Coeur d'Alene district of Idaho is deepening their main shaft from the 1,400-ft. level at the rate of about 5 feet a day. It is planned to sink the shaft to the 2,000-ft. level this year.

Leadville Tunnel Bill Passes

On April 14 the Colorado State Senate approved and sent to Governor Ralph Carr for signature, a bill to create an improvement district in the Leadville region, for the purpose of driving a deep level tunnel designed to unwater the mines of the area. The State House of Representatives had previously passed the measure, with several amendments.

Provisions are contained in the bill for an initial tax levy to pay costs of a preliminary survey for the project.

Salient Features of the CHERRY HILL MINE in Western Kentucky

By L. W. PICKEL
Superintendent of Construction
C. A. JENNE
Manager Mine Department
Louisville Gas and Electric Co.

The Cherry Hill mine of the Louisville Gas and Electric Company, located in western Kentucky is an efficient operation developed since 1939. It was planned from the beginning to use a belt conveyor in the main slope, and has many other modern and cost-saving features.

\+ + +

THE opening for the new Cherry Hill mine of the Louisville Gas & Electric Co. is located practically in the center of approximately 2,000 acres of coal rights in Muhlenberg County, western Kentucky. The Madisonville Division of the Illinois Central Railroad crosses the tract from the east to the west, about midway of the property.

The first work on this project was started on October 25, 1939, and consisted of the necessary grading for 4,700 feet of standard-gauge railroad siding tracks to accommodate about 29 empty coal cars and 33 loaded cars.

Main Conveyor Slope Over 750 Feet Long

The slope for the mine, which is used as an air-discharge conduit from the mine, also houses the coal conveyor and material track. It extends, on a 17° angle from the horizontal, from the surface a distance of 682 ft. to the bottom of No. 9 coal, the seam being mined, and thence 75 ft. on the same slope to the bottom of the pit under the belt-loading hopper. The slope has a clear width of 14 ft. and a clear height of at least 6.5 ft. (See Fig. 1.)

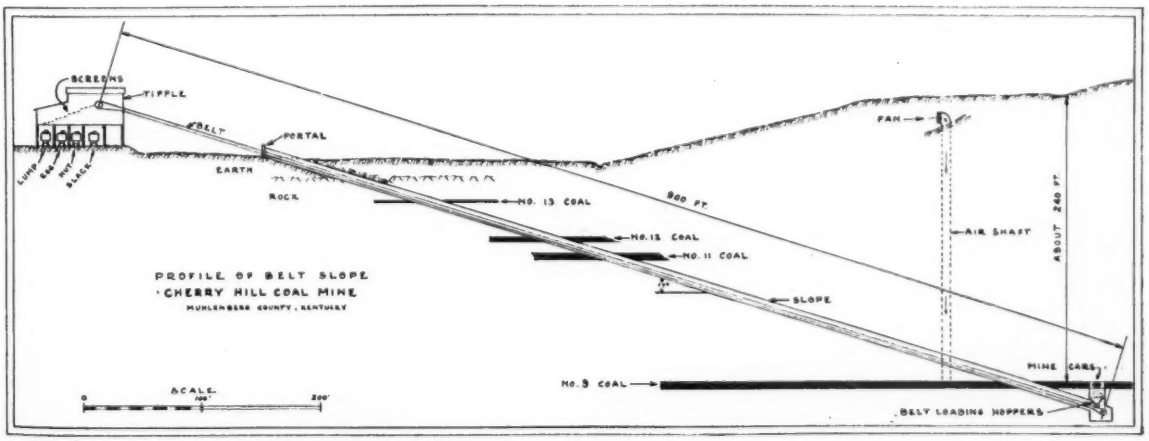
The first 105 ft. of the slope was made by the open-excavation method. The remainder of the slope was driven through carbonaceous shale, with the exception of five seams of coal, five layers of soapstone, a 63-ft. layer of sandstone, and 5 ft. of limestone.

Excavation on the open cut was started on December 16, 1939. The tunnel work was started on January 27, 1940, and was executed on three 7-hour shifts, six days per week. The average rate of progress was 5.6 ft. per day and included the time required for timbering the roof, 225 lin. ft. of which had to be supported on 10 x 12-in. bents on 4-ft. centers and covered with 4-in. lagging. The spoil was pulled up the slope in 2-ton mine cars by a steam hoist and emptied into a dump truck. Great care had to be exercised in keeping the slope safe for the workmen because of the unstable condition of the roof, which hindered progress materially.

The slope was shot to a three-point arch as nearly as possible. The average advance was about 4 ft. per shot and required an average of 2.28 lbs. of dynamite and 1.52 detonators per cubic yard of excavation.

The first 105 ft. of the slope was lined with a semicircular corrugated-steel liner plate 3/16 in. thick with a heavy asphalt protective coating on both sides and supported on a concrete foundation. Two hundred and one (201) ft. of the slope were lined with reinforced concrete, poured inside the timber bents. The sides were 8 in. thick and the flat and ½-pitch roof on either side were 10 in. thick. The remainder of the slope surface was covered with gunite concrete without rein-

Figure 1



forcing to an average thickness of 1½ in.

The coal hopper installed in the pit at the bottom of the slope has a capacity of about 100 tons and discharges coal through a reciprocating feeder onto the slope conveyor belt. The upper portion of the hopper is formed by the excavation and lined with gunite concrete; the lower portion is of steel. The conveyor extends from the bottom of the pit to the top of the shaker screen located in the 4-track preparation plant on the surface. The belt for this conveyor is 5-ply rubber 36 in. wide and has a capacity of 175 tons per hour.

The air shaft and emergency manway is 8 x 12 ft. and 225 ft. deep. It was necessary to line 89 ft. of the shaft with 8 x 8-in. timbers and the top 32 ft. was lined with a 10-in. concrete wall. The work was started on March 27, 1940, and finished July 3, 1940.

On the concrete section which extends above the surface is placed the all-steel housing of the 6-ft. Aerovane fan. The fan housing is equipped with explosion doors; also a steel door is placed in the manway entrance.

Surface Layout Planned for the Future

Figure No. 2 is a plan of the surface layout showing location of all buildings and structures. Within a radius of 350 ft. of the portal are located every building and structure, except the convertor house, fan house, oil house and magazine, the location of these being determined by state laws, insurance regulations, and inside mine development. Ample room has been allowed for expansion of any building, structure and yard storage facilities.

A surface track on which is used a battery locomotive serves all buildings, from which materials may be taken, and the timber storage yard. In loading materials from the storage yard, supply cars hoisted from the mine can be switched over to the yard storage track without uncoupling from the hoist cable. This feature is obtained by sloping the yard track toward the south, which allows the material car to run by gravity the full length of the storage track.

All buildings, storage yards, and other structures can also be reached by trucks on roads that have been made from the rock excavated from the mine slope.

The main building, a portion of which is two stories, is used for offices, first-aid room, washroom, storeroom, lamp room, and repair shop. This

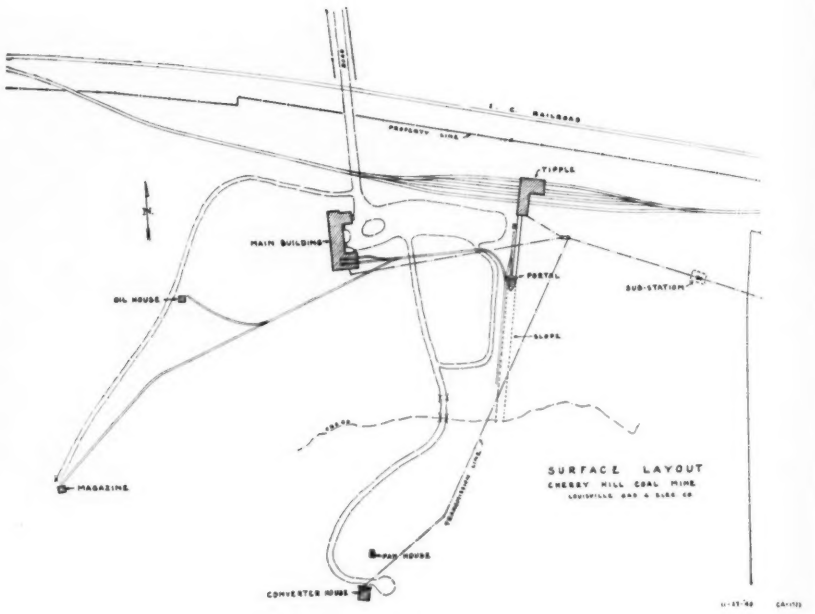


Fig. 2. Surface layout of the mine plant

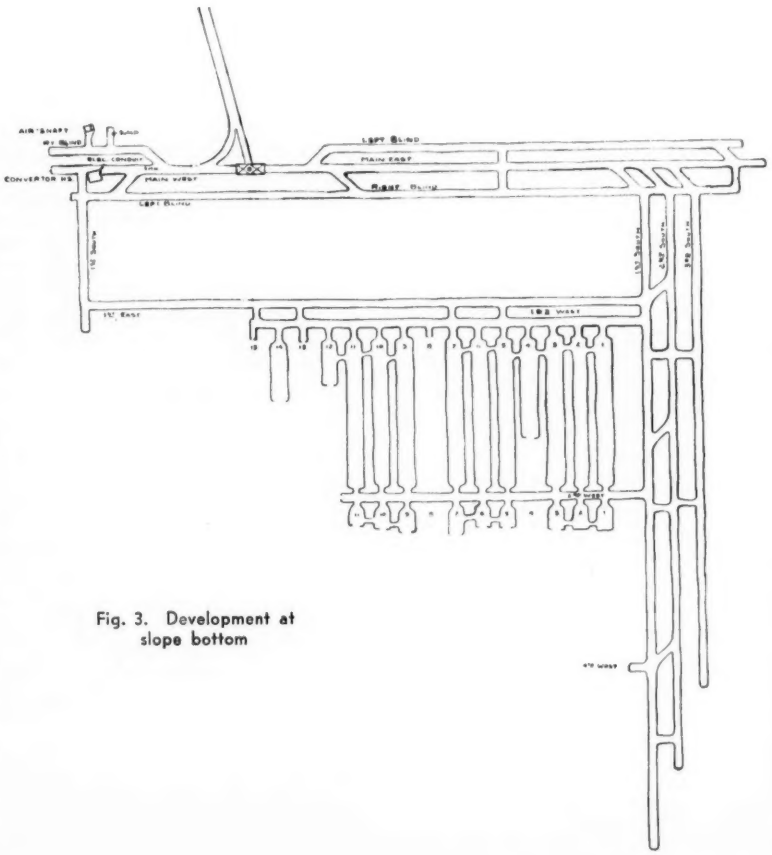


Fig. 3. Development at slope bottom

building was constructed of buff tile and has a floor area of 4,650 sq. ft.

The building is so designed that practically every surface activity can be handled within its walls, thereby allowing close supervision of every activity or operation. The employes' entrance lobby adjoins the storeroom keeper's office, where cap lamps and other materials and supplies are issued. The opposite wall of the storeroom separates it from the repair shop, but is connected by a door through which materials are issued to the maintenance men.

Underground Shaker Conveyors Are Equipped With Duckbill Heads

Four shaker conveyors, equipped with duckbill loading heads, are used for loading coal. Three of these are in rooms which discharge the coal onto a 30-in. rubber belt entry conveyor 635 ft. long. On this belt coal is conveyed to the car-loading entry, where it is discharged into 4-ton drop-bottom steel mine cars, pulled by trolley or battery locomotives to the coal hopper at the bottom of the slope. The other loading unit is used for driving entries and loads coal directly into mine cars. Additional loading units, cutters, drills, etc., are on order, which will increase the output of the mine about 50 percent.

Proposed Mine Development

The proposed development of the mine is to follow a general plan. The property has been divided into four sections, of which the southeast section is to be worked first. The procedure is to mine out all the coal on the west side of the first set of south entries on the advance and the coal to the east of these entries on the retreat, the length of the entry conveyor determining the size of the block of coal to be removed. After this panel has been exhausted, the equipment and men will then be moved to the next set of south entries, where the same procedure will be followed. The worked-out panel will then be sealed off permanently.

Figure No. 3 is a print of the mine map, showing the bottom development and the first set-up of the entry conveyor. The first west off the first south entry is used as an air course. In the second west entry the 635-ft. conveyor was installed. This belt gathers the coal loaded by the three loading units and conveys it to the first south entry, where it is discharged into the mine cars. The present plan of operation with four loading units is to work out the 15 rooms shown, then move all the equipment to the third west entry, work this out, thence to the fourth west, etc., etc., until the south property line has been reached. With the installation of additional equipment this plan will be somewhat modified, in order to allow for the loading of coal from both sides of the entry conveyor. This will require three entries to be driven for each belt set-up; however, practically twice as much coal can be loaded before the entry belt will have to be moved.

With the rapid improvements that are being made in the design and performance of mining equipment it may become necessary to change the plan of operation. However, the above layout which allows the sealing up of each block of coal mined out can very easily be changed to meet the conditions required by new or improved equipment.

Huge U. S. Coal Reserves Available for Gasoline and Oil Production

Experiments in applying the hydrogenation process to American coals indicate that this country can develop enormous amounts of gasoline and oil from its coal reserves, the Bureau of Mines today reported to Secretary of the Interior Harold L. Ickes.

The Bureau's process, if applied to the total coal reserves of the United States, could yield enough oil to supply the nation's needs for almost 3,000 years at the present rate of consumption. Coal reserves are estimated at some three trillion tons—enough to yield three trillion, 800 billion barrels of oil.

With the nation's petroleum reserves limited by nature the hydrogenation process which has been worked out in the Bureau of Mine's Pittsburgh laboratories gives assurances for the future of the gasoline age. While definitely establishing the process feasible and in certain circumstances advisable, the Government technicians have not estimated the cost of gasoline and oil produced from coal on a perfected quantity production basis.

As a preparedness measure, in anticipation of the day when America's petroleum reserves are exhausted or in serious danger of depletion, the Bureau of Mines is making an intensive investigation of all major types of domestic coals to determine their ability to yield gasoline and other oil products, Dr. R. R. Sayers, Director of the Bureau, said.

Chemical engineers of the Bureau, said Director Sayers, have just completed studies of various coals from four different regions of the United States, bringing to 13 the total number of coals that have been tested at the Bureau. These 13 coals represent typical, American varieties, ranging from high-volatile bituminous coal down to the lignites.

In a report presented by four Bureau of Mines chemists before the American Society, meeting in St. Louis, Mo., it was shown that the bituminous coals such as those obtained from the Pittsburgh bed, Pennsylvania, the Black Creek bed, Alabama, and the Lower Sunnyside bed, Utah, can yield an average of two tons of oil for each three tons of coal mined; and that the plentiful lignite coals, such as those found in North Dakota, can yield about a ton of oil for each three tons mined.

The tests were conducted at the Pittsburgh station of the Bureau of Mines in a continuously operating experimental plant capable of handling about 100 pounds of coal a day.

The crude oil produced from coal, Doctor Sayers declared, is similar to crude petroleum, and yields a relatively high percentage of gasoline and various oils. Some of these oils are of possible industrial significance as sources of phenolic compounds and solvents used in the lacquer and plastic industries. Other applications of these oils will develop as their properties are more thoroughly determined.

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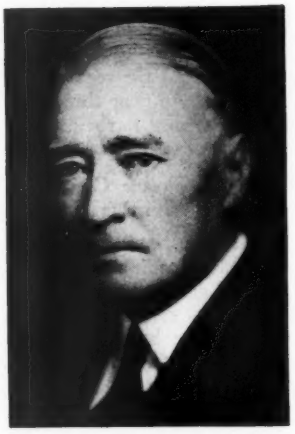
River Bed Coal Deposits May be Mined

The Atlas Coal and Dredge Company of Columbus, Ohio, has determined that coal deposits underlie the Ohio River near Moundsville, W. Va., but stopped plans for development when it learned that the State of West Virginia held the sub-acqueous rights to the river. It is reported that a proposal has now been made by the company to the State Public Land Corporation for approval by means of which this coal can be mined. Governor M. M. Neely, ex-officio chairman of the Public Land Corporation has called a meeting of that body to consider the proposal.

The company wishes to dredge the coal from the river bottom and has asked the right to lease about 1336 acres of river bottom, extending from a point near Moundsville, 15 miles down river. Dr. W. H. Hodge, director of the engineering experiment station at West Virginia University, and a member of the State Public Land Corporation, has estimated that a possible 4,000,000 tons of minable coal lie under the river; and in some places the seam's outcrop in the river bottom.

ADEQUACY OF CERTAIN MINERAL RESOURCES*

No one can speak with greater authority on mineral resources than can Dr. Finch, a former Director of the United States Bureau of Mines. In this paper he discusses the whole broad field of strategic and necessary metals, and the present outlook for complete self-sufficiency in this regard.



By JOHN WELLINGTON FINCH
Consulting Engineer, New York City
and former Director,
United States Bureau of Mines

Strategic Metals

THESE are generally considered to be minor metals, because the quantities used are so much less than of iron, copper, lead, and zinc. The Army and Navy Munitions Board defines "Strategic materials" as those upon which we are largely or entirely dependent on countries outside the continental limits of the U. S. There are 14 strategic materials, including rubber, silk, manila fibre and such things needed for military use, and among these there are seven strategic metals. The amount of each produced in this country before the present European war and before our defense program was started are as follows, given as percentages of our consumption of each:

	Percent
Manganese	5 to 6
Tin	.2
Nickel	.5
Chromium	1
Antimony	10
Mercury	40
Tungsten	50

During the 23 years since the first World War, our strategic metals position has improved in some cases, but has been aggravated in others by the increasing certainty that we are hopelessly destitute in some of them.

The Strategic Minerals Act passed in June, 1939, was an enabling act under which appropriations up to $100,000,000 could be made. Its purpose was to authorize the acquisition of stocks of strategic metals and to develop these within the United States for purposes of defense, but the first year's appropriation was only $10,000,000. Of this $350,000 was allocated to the Bureau of Mines, and $150,000 to the Geological Survey to conduct field investigations and do actual development of deposits to determine their extent and availability for production. Stripping outcrops, diamond drilling, and other means of development have been employed. The appropriation for these purposes has since been increased and an efficient program of field work is being carried on. In connection with the development of ores, the Bureau of Mines has also conducted metallurgical experiments to determine the best method of utilization of the ores, and its results are available to operators that cooperate with the Government.

Manganese is Strategic Metal Required in Greatest Quantity

Of all the strategic metals manganese is required in the largest quantities. The latest figures found show 1,294,000 tons of total imports of ore for a year and only 40,000 tons domestic production. However, it is one of the deficient metals of which domestic production promises to improve.

Manganese is found in several minerals and forms of ore bodies. The silicate (rhodonite) occurs in considerable tonnages in veins with other metals but as yet its reduction to a usable manganese product has not been accomplished commercially.

More than 35,000,000 tons of manganiferous iron ores containing 8½ percent to 9½ percent manganese and about 27 percent iron have been developed in the Cuyuna Iron Range. By further underground work this tonnage can be increased. Hitherto this manganese has not been utilized because it could not be separated economically from the closely associated silica and excess iron and phosphorus, to make a product that can be smelted into acceptable ferromanganese. Research is being conducted by the Bureau of Mines and private investigators. It is indicated that by chemical and metallurgical methods the manganese can possibly be recovered in large quantity, but this can not be done immediately, nor at present manganese prices.

The readily usable manganese ore deposits are oxides and carbonates. High-grade oxides are found in small bodies in many places but no important high-grade bodies of large tonnage have been discovered in recent years. In the Appalachian states many scattered deposits aggregate a large tonnage but, even where operating cost is reasonably low, tonnage is not sufficient to return the expenditure necessary to equip the mines and install treatment plants.

In the region of Chamberlin, S. Dak., there is an immense deposit in a sedimentary bed averaging from 1 percent to 3 percent manganese in

* Presented at the Annual Meeting, Chamber of Commerce of the United States, Washington, D. C., April 30, 1941.

the form of nodules, which when separated from the rock as a concentrate have a content of 16 percent manganese. Such concentrates, unfortunately, are well below commercial grade. Research for utilizing this deposit has been under way for some time and still continues.

At Artillery Peak, Ariz., a very large deposit of oxide ore averaging 12 percent to 15 percent manganese is probably capable of easy mining and successful metallurgical treatment, but it is located far from transportation and market. It is, however, an important possible emergency source that will require a heavy investment in large-scale equipment. Experienced mining people will volunteer to develop and equip this property for large production if the Government will assume a proper share of the cost of equipment and of delivery to steel plants. Production could not be started in less than 18 months.

On the Olympic Peninsula in Washington there are extensive low-grade deposits of the oxide hausmannite and the silicate bementite. These also, if they are to be utilized, must be equipped on a large scale, and Government participation would be necessary.

The forced production and high prices during the last war brought out one-third of our requirements from domestic mines, but, despite the high prices, most of this manganese was produced at a loss. About 80 percent came from the Butte and Philipsburg districts of Montana. Philipsburg ore is high-grade, but its reserves have been seriously reduced. At Butte, however, several million tons are available of moderate-grade (23 percent) carbonate ore (rhodochrosite). This ore can be concentrated and upon calcining, yields high-grade nodules, assaying 58 percent manganese. Equipment is now being installed to treat this ore on a large scale, as a contract with the Government was executed in August, 1940, to deliver 300,000 tons of nodules at the rate of 100,000 tons a year. As this operation becomes established it is probable that a somewhat larger quantity of this high-grade and desirable product can be supplied.

Manganese Imports

Extensive deposits of oxides have been under development and experimentation in Cuba in recent years. It now appears that the United States can obtain from that source 130,000 tons a year of good-grade (46 percent) concentrates, satisfactory to consumers, and duty free under the existing treaty.

Normally, we buy 21 percent of our imports from the Western Hemisphere and have had to obtain 79 percent of our requirements from other continents. Under the present conditions of ocean transport our only sure outside sources are in South America and Cuba although possibly supplies can be continued from the Gold Coast, Africa, which is an important source. Arrangements for export license would have to be made with the British government.

Much study is being given to the possibility of economizing in the use of manganese by: (1) Reducing the amount used through improvements in furnace procedures; (2) substituting low-grade material for high-grade products such as ferromanganese; (3) substituting other de-oxidizing agents; (4) substituting other metals, such as molybdenum, of which we have an abundance, as a strengthening agent in steel. Nickel and chromium can be used for the same purpose provided that these metals continue to be supplied by Canada. Some of these improvements undoubtedly will be worked out, particularly in larger use of spiegeleisen as a substitute for ferromanganese.

The metallurgists of the Bureau of Mines have developed an electrolytic process to produce manganese metal 99.9 percent pure. This is the first manganese of high purity that has been made. The Bureau announced that most of the low-grade ores can be used in this process. It remains to be seen whether this product can be adapted to the requirements of steel manufacture, which has heretofore used ferromanganese at less cost. The new product can, however, certainly be utilized promptly in the production of alloys. New ones having special qualities already have been made.

As the writer interprets the outlook for the future, we can expect the following deliveries of manganese for defense.

Butte, promptly	100,000 tons,	58%	nodules	58,000 tons mn. a yr.
Philipsburg		48%	concentrates	5,000 do.
Cuyuna Range, after two years, possibly				50,000 do.
Artillery Peak, after two years	100,000 tons,	48%	concentrates	48,000 do.
From scattered small mines				10,000 do.
Cuba, immediately	130,000 tons,	46%	nodules	59,800 do.
Brazil, with U. S. aid				50,000 do.
Gold Coast				125,000 do.
For prompt delivery, total				257,800 do.

By further expansion of equipment on low-grade mines above listed, and by bringing in others, such as those of the Olympic Peninsula, it might be possible in four or five years to supply all our peace-time needs. Costs will be somewhat high at first and metal prices must be correspondingly increased. But with proper management costs should be reduced gradu-

Drilling antimony-bearing outcrop exposed by bull-dozers. Valley County, Idaho

Photo from U. S. Bureau of Mines

ally until a price will be necessary which is higher than that of imported materials only by an amount sufficient to cover the higher cost of American labor, in mining and treating the ore, also as reflected in the higher cost of equipment, supplies and transportation here than abroad.

The Strategic Materials Act of 1939 authorized $100,000,000 appropriations primarily to purchase stockpiles of strategic materials from any sources. The first year's appropriation was only $10,000,000, as already stated. Prior to March, 1940, 68,000 long tons (76,160 short tons) of manganese had been bought. Present stocks are supposed to be adequate until the middle of 1942. It is unfortunate that this reserve stock was not built up to at least three years' requirements.

It is urgent that the work of the U. S. Geological Survey and of the Bureau of Mines both in the field and in metallurgical research, should be continued. Whatever reliable information we now have on our strategic mineral possibilities are derived mostly from the investigations of these bureaus. We need their results whether we are at peace or at war.

Tungsten

There are widely distributed tungsten deposits in 11 Western states. Ninety percent of domestic production has come from Nevada, California, and Colorado. The metal occurs in two mineral forms, scheelite and wolframite, or hubernite a related mineral. Tungsten is not generally associated with other metals in ores.

The most important production is from Nevada. Scheelite reserves are not blocked out and satisfactory estimates cannot be made, but new deposits are being discovered and an important output from this state is assured. At Randsburg, Calif., wolframite deposits have been developed to a depth of 1,400 ft. and are supplying 95 percent of California production. Large low-grade bodies near Bishop, Calif., and in other places are promising. Mining and metallurgical methods have been worked out and large-scale equipment is now being installed at Bishop. It is expected that 1,000 tons a day will be treated, containing about 10 pounds of tungsten and 10 pounds of molybdenum a ton. In connection with developments upon antimony deposits at Yellowpine, Idaho, the Bureau of Mines has uncovered what appears to be an important body of tungsten ore from which production is being started.

About six million pounds a year have been imported recently, China supplying 45 percent of this, Bolivia 24 percent, and small amounts come from Argentina, Mexico, and Peru.

The average price of tungsten has been for several years somewhat more than $1 a pound. A recent quotation is $1.17. It is possible that at an increased price domestic production sufficient for the needs of the country can be stimulated.

Tin

The United States in ordinary times uses over 80,000 tons of tin metal, which includes an average of about 28,000 tons of secondary metal recovered from tin plate and other scrap. We consume about half the world production. If we should supply our manufacturing industries on their present scale and take care of defense requirements, about 100,000 tons of metal a year will probably be needed.

The principal tin mineral is cassiterite (78 percent Sn.). This is associated in some ores, as in Bolivia, with the sulphide stannite. The most important production is from placer gravels in the Malay States, Straits Settlements and Netherlands India. There are lode deposits in Bolivia, Cornwall, and China. Tin has first rank as a strategic metal in the U. S. because it is so essential for military equipment and in our normal national economy, and because we can mine so little of it. About 99 percent of it has been coming from overseas.

It has been found as a mineralogic curiosity in many places in this country. Over $5,000,000 has been spent upon deposits that contain a little tin, for prospecting, development and treatment plants, in South Dakota, Texas, California, North and South Carolina, Virginia, Alabama, and Nevada, but almost nothing has been produced. Even the high prices of the last war stimulated very little mining.

The best known lode deposits are in South Dakota. They contain a few hundred thousand tons of ore that contains from 7 to 12 pounds of tin per ton. These could produce several thousand tons of tin at a price of $1 a pound. The only United States sources at present prices are placer deposits in a small area in Alaska. After two or three years of preparation, equipment and high prices, about 3 percent or 4 percent of our annual consumption might be supplied temporarily, principally from Alaska.

The most important tin vein deposits in the world, from our viewpoint, are in Bolivia. The ore averages 60 pounds or more of tin to the ton. Mining conditions are very difficult at extremely high altitude and metallurgical recovery of the tin is troublesome. These ores have been smelted in England, Germany, and Holland. A smelter is now under construction on the gulf coast in Texas to treat Bolivian ores and concentrates. It is hoped that it may be completed and working successfully before the Government stockpile is used up.

Experiences in the last war deserve careful thought. It became difficult and expensive to import tin from the Straits. A smelting plant was built at Maurer, N. J., and started to treat Bolivian concentrates in March, 1916. Direct smelting did not yield merchantable tin. The concentrates contained arsenic, antimony and up to 2 percent of zinc, and other impurities, that had to be removed. Roasting furnaces to drive off sulphur were necessary, an electrolytic refinery had to be added to make a satisfactory tin metal, and there were other unexpected details of equipment. The plant had an assumed capacity of 60 tons of tin a day maximum, but its output ranged from 5,000 to 15,000 tons a year for seven years. Then it was closed down. It is understood that the venture resulted in a loss of some $2,000,000.

A recent English treatment charge for Bolivian concentrates is quoted at $60 per long ton with payment for tin at 1 cent below Straits price and less one unit (224 pounds) of the tin contained.

No entirely satisfactory substitutes for tin have been found. For food containers now made of tin plate, steel coated with lacquer may be substituted for the preservation of some products, but not for all, and terneplate (lead-tin alloy) for cans containing paints, oils and gasoline. Much of the tubing now made of tin may be made of other metals. The use of terne-plate for roofing and such purposes can be discontinued. Substitutes, though not entirely satisfactory, for some uses of solder and bronze have been found. However, it is not probable that consumption of tin can be reduced more than 25 percent or 30 percent, leaving our essential requirements still around 70,000 to 75,000 tons a year.

It is evident that the Government should have started to accumulate a stockpile years ago. In February it was estimated that stocks would last 15 months, but Mr. Knudsen recently announced a threatened shortage. We shall probably have to rely upon our English friends to obtain for us supplies from the Straits.

Nickel

The small amount of nickel produced in the United States is obtained as a by-product in the electrolytic refining of copper ores, and amounts to only a few hundred tons a year. Low-grade nickel ores occur in a few places in the United States. Most of these deposits are small, but one of considerable size, and containing a small amount of nickel associated with precious metals in a low-grade copper ore, occurs in Nevada. In Colorado, several small bodies of ore containing better percentages of nickel, associated with cobalt, have been found. There is near Riddle, Ore., a deposit of genthite, or nickel silicate, somewhat similar to the garnierite ores of New Caledonia, but the size of the Riddle orebody is uncertain. Half a century ago, at the time when New Caledonia was the main source of the world's nickel, an attempt was made to work the Riddle deposit, but the coming of Sudbury ore upon the market at about that time with the attendant decline in price of nickel, ended the attempt. Probably a price of around $3 a pound would be necessary to bring about domestic production of nickel.

The main source of nickel is at Sudbury which supplies through the International Nickel Company between 85 percent and 90 percent of the world's nickel consumption. New Caledonia still produces about 5,000 tons of nickel a year, compared with around 113,000 tons from Sudbury, and is the only other area in the world that produces more than 1,500 tons of the metal a year.

The only deposit of nickel outside of the Sudbury district that has much promise is the nickel-pyrrhotite orebody at Petsamo in the north of Finland. International Nickel was developing this orebody and preparing it for production when Russia invaded Finland in 1939.

The Canadian output of nickel is being husbanded carefully to meet the requirements of Canada, Great Britain and the United States. Demand exceeds production and close supervision has become necessary. There is ample production to supply all armament requirements of these countries, but for several years the civilian needs of the world for nickel will not be filled completely.

Chromite-bearing exposure, Siskiyou County, California

Photo from U. S. Bureau of Mines

Chromium

The mineral from which chromium is extracted is chromite. Production has been made in this country mostly from scattered small deposits in California.

About 97 percent of the ore used is imported, coming mostly from Rhodesia, Cuba, and the Philippine Islands. The Rhodesian ore is the highest grade (about 53 percent); Cuban the lowest (averaging 33 percent). There are known small deposits in eight states and in Alaska. The largest are in Wyoming and Montana, but these contain a high percentage of iron and concentrates from them have not been acceptable.

We now need 500,000 tons a year. During the World War domestic mines produced 44 percent of the chromium used, mostly from California. The government is planning to develop and operate chromite mines in Montana on a large scale and has requested experienced mining people to work out metallurgical processes for improving the product from these ores and supply management.

Chromite ore containing 48 percent has been selling recently at $25 to $28 per ton, but is now quoted at $41.

Explorations by the Geological Survey and the Bureau of Mines have determined that there are deposits adequate to supply the needs of the country if metallurgical experiments are successful, and it is expected that they will be. Prices will have to be advanced somewhat to take care of the higher cost of production in this country.

If overseas sources are cut off, we can depend upon an increase of Cuban production which should be capable of metallurgical improvement. Canada can also increase production and Brazil may be a source. The Philippine Islands can be counted upon for about 75,000 tons of ore of good grade.

Antimony

Antimony has been a deficient mineral in this country largely because, due to price, producers have not been able to compete with foreign sources. The United States ordinarily used 45 percent of world production, 18,000 tons or more. Much larger amounts may be required for our combined industrial and defense uses.

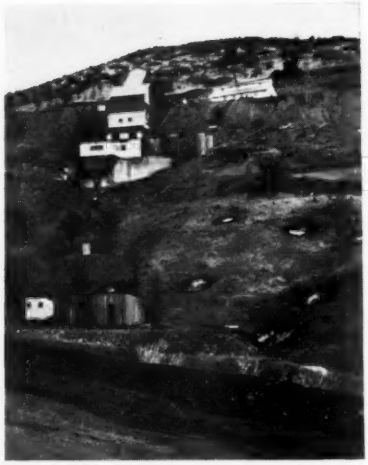
In this country antimony has been obtained mostly as a by-product from lead, copper, gold, and silver ores. Deposits in vein form in which it is the principal metal are unusual, but important bodies of such ore have been under development in the Yel-

low Pine region, Idaho. This ore contains important amounts of gold and silver. The mines are handicapped by distance from the railroad, but satisfactory transportation by trucks, except in the winter season, has been worked out. The Bureau of Mines has developed both a pyrometallurgical and an electrolytic process for treating these ores. High-grade electrolytic antimony is also being made by the Bunker Hill and Sullivan Company at Kellogg, Idaho.

Although it is difficult to estimate with any degree of accuracy what amount of domestic production may be made, evidently there will be an important and rapid increase. The Government has not created a large stockpile of antimony because the inadequate appropriation had to be used for other deficient metals that were given priority. Our principal imports in the past have been from China. A small amount continues to be delivered, but most of this supply has been cut off by the Japanese blockade. Our imports next in quantity have come from Bolivia and Mexico. The Mexican ores have been imported to Laredo, Tex., where they are smelted. This has become a production of increasing importance. The outlook is good for an adequate supply from the sources of antimony now available to us.

Mercury (Quicksilver)

Normally the United States consumes about 35,000 flasks of 76 pounds each. Requirements for defense will increase this amount considerably. The principal producing mines are in California but some deposits are being worked in Texas, Oregon, and Nevada. Ores are not developed in large quantities in advance of production. Therefore the amount of reserves cannot be accurately estimated. At ordinary prices, considerable quantities are imported, up to a million pounds and more a year. The price per flask over the past 50 years generally has ranged from $40 to $90, but during the World War it went to $125 and since the present European War began, prices as high as $182 a flask for domestic mercury and $200 f.o.b. Spanish and Italian mines have been paid. Such prices are stimulating production from the larger mines and from many small ones in the Western states and it appears probable that sufficient ore will be produced for our needs. Mr. Leon Henderson recently



Abbott Quicksilver Mine, Lake County, Calif.

announced that the price is too high and that we are making a domestic output of 40,000 flasks a year which exceeds indicated consumption, including defense. The fact remains that adequate production was brought out by increased prices.

The present import tariff is 25 cents a pound or $19 a flask. In case of deficient domestic production increased imports from Mexico can probably be made. The customary imports from Spain and Italy have been discontinued.

Magnesium

The pure metal magnesium, one-third lighter than aluminum, is soft, has a silvery lustre, and in the form of powder or foil, burns with intense light and heat. It is therefore used for tracer bullets, star shells, flares and certain kinds of bombs. Its most important alloy is with aluminum. This alloy has high strength and light weight, so is important in the construction of aircraft, being used in engine blocks and for other parts. The mineral magnesite is used directly as a refractory material for lining smelting furnaces.

Domestic production of magnesite comes mostly from California and Washington. The most important source of magnesium metal is sea water, from which it is extracted in considerable quantities. Mr. Knudsen recently announced that a shortage in magnesium begins to appear, but it is believed that production can be sufficiently stimulated to render the country self-sufficient. The Government is doubling the capacity of the Dow Chemical Company plant at Freeport, Tex., to bring it up to a production of 18,000 tons of metal a year. This company has been the only producer of the metal. Private capital is erecting a plant with a capacity of 12,000 tons of metal in California.

The Bureau of Mines has developed a process for making magnesium from the large deposits of magnesite at Chewelah, Wash., where the metal is being produced on a pilot plant scale and it is hoped that a larger plant may be put into operation in the near future.

Molybdenum

Molybdenum is one of the ferro-alloying metals of which the United States has ample supplies for meeting all its requirements. Of the world's output in 1939 of approximately 33,000,000 pounds, 90 percent was produced in the United States from domestic ores.

The principal deposit of molybdenum is at Climax, Colo. This orebody supplies two-thirds of the world production and 72 percent of domestic. The rest of the molybdenum comes from concentrates obtained in the treatment of certain copper ores.

Mica

Certain varieties of mica are "strategic" materials. These are sheets, and so-called splittings, used in radio tubes, condenser sheets for airplane spark plugs and washers, and magneto condenser films. Only a small amount of the grades required for these purposes is produced in this country. Much of our supply has come from India, and an increasing amount has been imported from South America. There has been an increase of domestic production, but no estimate of future production appears to be possible.

About three million pounds a year of sheet mica are used in the United States.

Asbestos

Certain non-metallic minerals are classed by the Army and Navy as "critical." Among these is asbestos.

Only a small percentage of our requirements for use in brake-linings and clutch facings is produced in this country. These uses require a high-grade material.

(Part II, on Major Metals, will appear in the July issue.)

Manganese in Montana

Rhodochrosite from the mines of Butte will aid materially in filling defense needs for this essential mineral. The manganese deposits at Philipsburg may also become an important source of supply.

By C. J. TRAUERMAN
Butte, Mont.

IT IS a far cry from the "blackouts" on the British Isles to the black mineral deposits found at Philipsburg, Granite County, Mont. However, there is an intimate connection. When the "blackouts" occur all lights in the cities and hamlets are put out. When it is necessary to use a light, flashlights play an important part. If you will break a flashlight battery in two, you will find that a black material is the heart of the battery. This black material is a high-grade ore known as manganese dioxide, and Philipsburg is one of the principal domestic producers of this ore.

However, the most important demand for manganese ore, one of the chief strategic minerals, comes from the steel industry, and for the steel industry it is not necessary to have such a pure form of manganese ore as is used for batteries and for other chemical purposes.

The steel industry of the United States this year will probably consume about 1,000,000 long tons of high-grade manganese ore and concentrates, while the chemical industry will use only about 45,000 tons. In normal times most of the manganese ore used in the United States was imported. About 8 percent of these imports came from Brazil, 12 percent from Cuba, 25 percent from the Gold Coast of Africa, 7 percent from British India, 38 percent from Russia, and the remainder from other countries. Due to the shortage of ship bottoms and blockades, these figures have been radically changed since the beginning of World War No. 2 and imports have been drastically reduced. Taking cognizance of the unavailability of imports of manganese, the government of the United States, through its various departments, is taking active steps to establish an industry leading to the production of a greater tonnage of domestic manganese ore.

In World War I Montana Was a Large Producer

Previous to World War No. 1, Montana had produced only 137 tons of high-grade manganese ore, which was shipped as a test lot in 1900 to a steel mill in Chicago. In 1916, Philipsburg produced only a little over 3,000 tons of chemical and metallurgical manganese ore. In 1918, Philipsburg shipped 127,415 tons of high-grade manganese ore.

In Butte there is a large deposit of rhodochrosite, which is a carbonate of manganese and has a translucent pastel pink color. This is the only large deposit of pink manganese discovered in the entire world. A large tonnage of high-grade pink manganese was shipped from Butte in 1918. Several additional deposits of manganese were found at different points in Montana. From a beginning of only 3,000 tons in 1916, Montana, in September, 1918, was shipping at the rate of over 40,000 tons of high-grade manganese ore per month, or better than half of the domestic consumption that year.

Butte Ores Will be Concentrated, Roasted and Nodulized

In attempting to stimulate domestic manganese ore production, Montana would be expected to furnish a large tonnage, due to its 1918 record. Already the Anaconda Copper Mining Company has been given a large contract to furnish roasted and nodulized high-grade manganese concentrates. This company is spending over $1,500,000 at the Washoe Reduction Plant in Anaconda to concentrate second-class pink manganese ores from the Butte mines. After the ores are concentrated, most of the impurities such as zinc, lead, copper, sulphur, phosphorus iron and silica will have been eliminated. The concentrates will then be roasted and nodulized, eliminating the carbon dioxide content and putting the concentrates in rather coarse form, after having been put through the mill to finer than 300 mesh. The concentrates will be stockpiled and used by the steel industry as required. These concentrates will assay higher in metallic manganese and lower in impurities than any other large quantity of manganese in the world. Pink manganese was first successfully concentrated by an independent engineer during World War No. 1 but the present process of concentrating was developed by the engineers of the Anaconda Copper Mining Company. The roasting and nodulizing process was developed by Anaconda and the Domestic Manganese and Development Company. The latter company has a roasting plant in Butte and may roast some of the concentrates produced at the Washoe Reduction Plant.

At present the government specifications for furnace manganese ore are very high, much higher than they were during World War No. 1. If these specifications are lowered or if the price of manganese should advance to World War No. 1 figures, Philipsburg should again become a large producer of manganese ores for the steel industry. Meanwhile, Philipsburg is increasing its production of battery and chemical ore by concentrating the lower grade ores with magnetic concentrators.

Through the efforts of the U. S. Bureau of Mines, the U. S. Geological Survey, the Montana Bureau of Mines and Geology, and the WPA Montana Mineral Resources Survey, quite a number of new low-grade manganese deposits have been found, mapped, and sampled. These deposits are mostly undeveloped but they will be developed and can furnish a substantial tonnage when there is need for lower grade ore. Through the technical bureaus above mentioned, research work also is being carried on to find new methods of cheaply concentrating the lower grade ores.

The St. Lawrence Seaway—Then What?*

Study of the proposed St. Lawrence Seaway is convincing a vigilant and aroused public opinion that the detriments of this project to the country far outweigh the possible benefits to be derived, and that many of the arguments advanced for building it now are false. Mr. Tallamy here presents the results of a thorough study of this question, leading to the conclusion that the Seaway should not be built.

By B. D. TALLAMY
Chief Engineer
Niagara Frontier Planning Board

THE Niagara Frontier Planning Board, the official regional planning agency of Erie and Niagara Counties, N. Y., of which I am chief engineer, long believed that the St. Lawrence Seaway project if constructed would completely upset the commercial interests and general economy of the Niagara Frontier. Prior to making an official statement pertaining to the project, however, they directed me—and in fact the entire staff of the Planning Board—to make a detailed study of the project and report our major findings to them. Of course, before studying in detail the many economic ramifications of such a tremendous undertaking it was necessary to know certain fundamental facts.

The Seaway is primarily a waterway project for it is proposed to create a 27-ft. navigable channel through the St. Lawrence River from Montreal to Lake Ontario; and through the Great Lakes and their connecting waters. In order to do this, many natural barriers must be overcome, especially in the International Rapids section of the St. Lawrence River lying between the State of New York and the Province of Ontario, and in the Soulanges and Lachine sections of the river lying wholly within Canada. In this stretch of 97 miles, nine huge locks would be required, besides the construction of side canals and great dams.

The Welland Canal would also be an integral part of the entire Seaway. This is 30 miles long and connects Port Colbourne on Lake Erie with Port Weller on Lake Ontario. In this section there are seven locks, each having a lift of approximately 46½ ft. The depth of water over the sills is 30 ft.; therefore, no work would be required on these Canadian locks in order to create a 27-ft. waterway. But excavation would be required—a large amount of it rock—throughout the entire length of the open channels because there the existing depth is only 25 ft.

Similar channel excavation would be required in the waters connecting Lake Erie with Lake Huron. In the St. Mary's River it would be necessary to construct another great lock as well as to deepen the interconnecting channels.

In the International section, that portion of the river extending from Lake Ontario to the northern boundary of the State of New York, the river drops approximately 92 ft. One-third of this occurs in the first 18 miles and the remaining two-thirds below that point. In order to overcome this difference in elevation it is necessary to construct great dams and levees in the vicinity of Messena, N. Y. Since this type of construction is required, it is proposed to utilize the difference in elevation created by the dams to generate hydro-electric energy. Therefore, in reality, the St. Lawrence Seaway project is a combined navigation and power undertaking.

Existing Waterways Connect the Great Lakes to the Sea

There are presently three major inland waterways which link the Great Lakes with the seas. In fact, there is an existing St. Lawrence Waterway connecting Lake Ontario with the Gulf of St. Lawrence and following the identical route proposed for the Seaway. This canal has a depth of 14 ft. and now affords passage for small ocean-going freighters.

In addition to this route, there exists the New York State Barge Canal system, and the Illinois-Des Plaines Canal and Mississippi Valley Waterway connecting Lake Michigan with the Gulf of Mexico. By the use of three different canals the mentioned Barge Canal system connects the St. Lawrence River, Lake Ontario, and Lake Erie with the Hudson River and through that channel with the harbor of New York. The most important of these are the Erie Canal, connecting Buffalo to Three Rivers, N. Y., and from there to Albany; and the Oswego Canal, connecting Lake Ontario at Oswego with Three Rivers, N. Y., and from there by the same channel to Albany. From Buffalo to Three Rivers the channel has a minimum depth of 12 ft., and from there to the Hudson River the channels are presently being deepened to 14 ft. and clearance under bridges increased to 20 ft. The Oswego Branch, connecting Lake Ontario to Three Rivers, a distance of 24 miles, has a channel depth of 14 ft. with bridge clearances of 20 ft.

The connection between Chicago and the Mississippi River, through the Illinois-Des Plaines Canal, has a depth of 9 ft. and bridge clearances of 17½ ft. From the point of view of national defense this is the most pro-

* Presented at the American Mining Congress Convention, Cincinnati.

tected Great Lakes outlet to the sea in either this country or Canada.

Materials and Labor Involved

Since the project is being submitted to the Congress and the people as an urgent defense measure, it is necessary to have a greater understanding as to the quantity of labor and material involved. Because of the colossal nature of the undertaking it is obvious that many thousands of skilled and unskilled workmen, engineers and technicians of all kinds would be required, together with hundreds of contractors, contracting organizations and all kinds of mechanical equipment. In the International Rapids Section alone some 92,000,000 tons of excavation would be required over 7,000,000 tons of concrete would have to be used, besides huge quantities of earth fill, steel, equipment, etc. If the work were evenly distributed over a period of seven years, at least 43,000 men would be required daily at the site and behind the lines furnishing materials and equipment. Undoubtedly the daily requirements during the peak period of construction would exceed 60,000 men. If all of the work required for the entire project is carried on at the same time, at least 100,000 men would be required for the work every day for a seven-year period.

Estimates of Cost

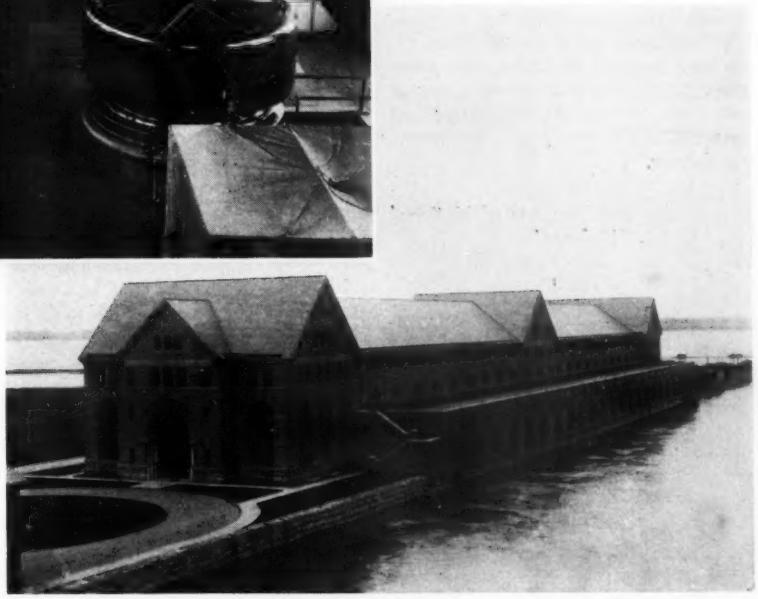
In 1926, the Joint Board of Engineers reported on the cost of the entire construction. Their figures, which are the only estimates for the entire undertaking, did not include certain costly and essential parts of the project. For instance, the estimates did not include temporary financing, in spite of the fact that it was agreed the project would take at least eight years to construct, and they did not include a sufficient amount for contingencies. Only 12½ percent was allowed for engineering inspection, legal fees, maintenance for labor camps, borings, and contingencies. This should be at least 25 percent and that is the amount suggested in the report of the Niagara Frontier Planning Board. The recent estimate by government engineers for the International Rapids Section portion of the work alone, accepts and uses the 25 percent contingency factor.

No allowance was made for the deepening of harbors on the Great Lakes. What good is a 27-ft. waterway connecting the ocean with the Great Lakes if there are no harbors on the Great Lakes of sufficient depth to accommodate the vessels which might use the proposed 27-ft. channel? Certainly the principal harbors on the Great Lakes will have to be deepened in the event the St. Lawrence project is constructed. Such deepening must be charged off as a part of the entire scheme.

When these items are included, the project will cost at least $650,000,000. The ultimate cost including interest on the funds which would have to be borrowed over a period of years, would exceed $1,000,000,000. It might be even greater than this. Other similar undertakings greatly exceeded their estimates of cost. The Chicago Drainage Canal cost three times its estimate; the Suez Canal two and one-half times; and the Panama Canal, over twice the original figure.

Agriculture Not Benefited

A similar St. Lawrence Seaway undertaking was presented to the United States Senate in 1933, that time in



Inside and outside views of one of the many existing power plants in the St. Lawrence area. Potential capacity of some of these plants is not yet utilized

the form of a treaty signed by the governments of this country and Canada. The United States Senate Foreign Relations Committee held extensive hearings on the subject and the Senate itself thoroughly debated the proposal prior to refusing to ratify the treaty in 1934.

The principal supporters of the project then were men in public and private life who hoped to relieve the economic plight of the American farmer by its construction. Proponents of the measure had widely proclaimed that great savings would redound to the benefit of the American grain producers. They claimed savings from 6 to 8 cents per bushel, even 12 cents per bushel, in the shipment of grain from the interior of this country to European markets. At the time these statements were accepted as facts and naturally enlisted much support for the project. Since then, however, many competent investigations of any possible savings in the shipment of grain have been made and these clearly demonstrate the original claims to be gross exaggerations.

If the seaway was an accomplished fact, any savings in the shipment of grain would have to occur in the section between Montreal and Duluth-Superior because shipping conditions on the ocean from Montreal to Liverpool would remain unchanged. During the past 10 years, the average cost of shipping grain from Duluth-Superior to Montreal, including handling charges in that city, have approximately averaged 6 cents per bushel. The proponents were claiming a saving equal to or greater than the average cost of shipping the commodity. Actually any saving would not exceed 3½ cents per bushel and even this would not benefit the American farmer.

Is It to the Best Interests of National Defense?

Of course, there are still some supporters of the project who cling to the belief that the St. Lawrence Seaway would benefit the mid-western shipper. The main support, however, has now shifted to those public officials and citizens who contend that the project is necessary for our national defense.

If there was any question in my mind as to the necessity of the St. Lawrence Seaway for the defense of this country, I would not make a single statement in opposition to the undertaking or expense. I would be stumping the country in behalf of the Seaway. All of us who believe in the democratic way of life are ever willing to assume a greater financial burden in order to prepare this country for any eventuality and we are ready and willing to make personal and business sacrifices toward this end. But there is no question of the relationship between the St. Lawrence project and national defense. That undertaking would actually hinder rather than aid the re-arming of our country. All of the skills and labor, and all kinds of materials, contracting organizations and equipment necessary to carry on such a mammoth construction enterprise, are now sorely needed in the expansion of our emergency defense program. Needless to say, the same thing applies to the tremendous sum of money which would be required for the seaway. The diversion of this manpower, materials and equipment and huge sums of money from our defense efforts might so hamper the rearming of our country and Canada's aid to the British Empire as to actually jeopardize our national security.

The railroad facilities have been developed to handle the great volume of freight movement

Besides this, all competent authorities agree that the power portion of the project could not be completed within five years and the navigation portion of the works within six to eight years. That fact is enough to strip the guise of national defense from the project; it would be impossible to complete it in time to be of any use in the present world crisis.

Nor would the project represent good long-range national defense planning. Vital sections of the canal and power works are exceedingly vulnerable and because of this, use of the St. Lawrence Seaway and Power Project during war periods would dangerously concentrate defense industry and national production. Each of the eight locks in the Welland Canal and the nine in the St. Lawrence River would be vulnerable to aerial attack and sabotage. If any one of them was destroyed, it would close the Great Lakes to the sea for an indeterminate period of time.

The dam in the International Rapids section of the St. Lawrence, which is only a little over 200 miles from the seacoast, is especially vulnerable and, if destroyed, would trap all of the naval and other deep draft vessels lying within or being constructed within the Great Lakes area for the duration of any war. It might even cause grave damage to the port of Montreal and other vital areas between there and the dam.

Development of the Great Lakes Ship Building Facilities

Many statements have been made by the President and members of his administration to the effect that the St. Lawrence Waterway Project is now necessary in order that cruisers and warships, ships and more ships, may be built upon the Great Lakes to defend our country. Such statements must be designed only to secure support for the project from those who will blindly accept such statements as fact, because nothing could be more contrary to what would actually occur. It does not mean, however, that Great Lakes ship building facilities should not be developed. They should be, but for the construction of submarines, mine sweepers, submarine chasers, torpedo boats, and other similar naval craft—vessels which could be constructed and sent to the sea by

a number of existing routes. They could be shipped through the existing St. Lawrence Canal, through the Erie Canal-Hudson River route, or through the most protected outlet to the sea—the Illinois-Des Plaines-Mississippi Valley Canals. Such planned expansion of our inland ship building facilities would then leave the ocean and Gulf yards open for the construction of large-type vessels only. It would distribute defense work and not hazard the possibility of land-locking the larger fighting crafts 500 miles from the sea as a result of destroying one of many vulnerable locks or dams.

The Effect Upon the Lake Superior Iron Mines

In their eagerness to justify the St. Lawrence Waterway, proponents now claim that Great Lake iron and steel industries would substantially benefit by the seaway because ore from Brazil, Chile, Peru, Cuba, and other foreign countries would then be imported by that route.

Nothing could be farther from the truth. Importation of foreign ores in large quantities through the proposed St. Lawrence Seaway would have a ruinous effect upon the iron mine operators, shippers and smelters—in fact, it might eventually seriously impair the self-sufficiency of the steel industry of the United States and thereby, in the event of another world crisis, jeopardize our national security.

Before enlarging upon this statement, however, it might be well to review briefly the economic significance of the Lake Superior iron ore industry. The market for Superior iron ores is confined primarily to the Great Lakes and upper Mississippi Valley region. The industry now supplies about 86 percent of the iron ore consumed in the United States. In 1937, it shipped over 61,000,000 tons of ore to domestic consumers and over a million tons to Canadian furnaces.

The total investment in mines, railroads maintained by the iron ore business, and the lake vessels carrying that trade, exceeds $600,000,000. The industry pays in wages and in ore handling charges nearly $150,000,000 a year. This is exclusive of investment in 35 unloading docks on the lower lake ports where the ore is consumed or from where it is shipped by rail to inland furnaces. These unloading and rail facilities represent an investment of many additional millions of dollars, employing thousands of workers annually.

The Lake Superior iron ore mining industry alone supports 74 cities, villages and towns having a combined population of 190,000 persons. This is just one of many industries which would be seriously undermined, should claims of proponents as to the usage of the seaway come true.

Whatever wheat, grain or other commodities are exported from the United States to Canada and shipped via the St. Lawrence Waterway, an equivalent amount of tonnage is bound to flow into the interior of the country as ballast, commodities cheaply mined, grown or produced in countries where production costs are founded upon forced or cheap low standard labor. The dumping of ballast commodities into the currently protected inland market competing with American standards of production would certainly demoralize any industry affected.

In foreign countries there are vast iron ore deposits conveniently located with reference to ocean transportation. These deposits are of a good quality of ore suitable for American blast furnace practice and sufficient in amount to supply United States furnaces indefinitely. For instance, in Sweden there is an estimated reserve of 1,500,000,000 tons of very high-grade iron ore close to seaports which are open all year and connected by rail to these ports. In Russia, there are a billion tons of high-grade iron ore located on the shores of the Black Sea. In addition, there are several billion tons of a lower-grade ore but of a type that is easily concentrated, also located on the shores of the Black Sea. In Chile, there are a billion tons of high-grade ore, most of it near the seacoast, and in Brazil, seven to thirteen billion tons within 300 miles of the seacoast. In Cuba, there are three to five billion tons of ore located on the coast. Ore from these countries would make ideal ballast and could be brought into the Great Lakes area through the proposed St. Lawrence Seaway.

The iron ore industry is delicately balanced and the only protection it now has against ruinous foreign competition is the favorable geographic position it enjoys. The removal of that natural protection by the construction of the St. Lawrence Waterway would be sure to lower the existing high wage levels and the standards of living currently enjoyed by the workmen in the iron mines, the railroads, the lake transportation agencies and allied industries. It would damage and tend to destroy these productive enterprises and the communities directly dependent upon them. IT WOULD CAUSE THE IRON AND STEEL INDUSTRY TO DEPEND UPON FOREIGN SOURCES OF IRON ORE BEYOND ITS CONTROL. In the event of another world conflict or in the event of the United States being involved in a war of any kind, the dependence of the great iron and steel industry in this country upon foreign sources of ore might easily jeopardize the security of the nation. Above everything else, the United States must maintain self-sufficiency in iron and steel production.

Effect on Coal Mining Industry

The capital invested in the coal mining industry, which is one of the greatest within the country, exceeds $3,000,000,000. The industry employs some 450,000 coal miners and pays out nearly $600,000,000 annually in wages and salaries. Nevertheless,

Coal moves from mines to market over the railroads. The two industries are mutually inter-dependent

in spite of the size of the industry, it would be one of the principal sufferers should the St. Lawrence Seaway become an actuality. Practically everything that was said in reference to the dumping of foreign ballast iron ore in the currently protected inland market applies with even more force in the case of coal.

The United States now exports to the Dominion of Canada some 17,000,000 tons annually. This is mined in the fields of Ohio, Pennsylvania, West Virginia, and Kentucky, and shipped by rail to various Great Lakes ports. There it is transferred by special loading equipment to the great colliers plying between these ports and those of Canada.

Of all ballast cargoes probably the most convenient and adaptable to grain-carrying vessels is coal and inasmuch as the principal export commodity from both this country and Canada would be grain, it is logical to assume that the principal ballast import to both Canada and the United States would be foreign coals. At the present time, in fact, huge quantities of coal are being shipped from Wales to Canada, coming as far as Montreal. Formerly, the United States used to ship a large amount of the coal used in the Montreal area. But, upon deepening of the St. Lawrence River from Quebec to that city, the Canadian coal market was greatly curtailed as a result of the ocean-going vessels moving on into Montreal.

In the event the St. Lawrence Seaway is constructed the same principle would hold. Foreign tramp vessels carrying Canadian grain to Liverpool, London, and European markets would return to Canada with coal ballasts. As a result a substantial portion of the 17,000,000 tons now exported from the United States to the Dominion would be lost to foreign competitors. The same thing applies to Western United States markets. Whatever grain is shipped from Duluth-Superior and Chicago would bring into the country equivalent amounts of foreign ballast products.

Added to the huge loss of Canadian and American coal markets the industry would again suffer because of the substitution of hydro-electric energy for steam-produced power. In the International Rapids section of the St. Lawrence River it is proposed to develop a maximum of 2,200,000 horsepower. One-half of this would be the New York State share. Of this amount 720,000 horsepower would be firm power—that energy which could be relied upon at all times. The difference between the firm power and the 1,100,000 horsepower is called the secondary power—that which is available only at certain periods of the year, at times when the flow in the river is high. The total United States share of the electrical output (in reality New York power) proposed for the St. Lawrence is equivalent to 6,250,000,000 kilowatt hours. That amount of energy would displace, even with modern highly efficient steam plant usage, nearly 3,000,000 tons of coal annually.

In addition to the loss of the Canadian coal market, the loss of a huge amount of tonnage within the United States and the loss because of the substitution of hydro-electric energy for steam-produced power, the coal miners would suffer in proportion to the business which would be lost by the American railroads. Since these roads would not be required to carry the millions of tons of coal from the mines to the lake ports and would lose a huge amount of business to foreign vessel operators using the proposed Seaway, they in turn would purchase less coal from the mines.

Seaway Closed Five Months of Year

The more one studies the St. Lawrence Seaway Project the more one believes the only good feature about the undertaking is the fact that it freezes up for five months of the year. The navigation dates during the past five years averaged on the St. Lawrence River April 23 for the opening date and December 6 for the closing date. This indicates that the Seaway would be open on an average of approximately seven and one-half months. Actually, however, the affected time would be considerably less than this, because the time should be measured from the first day that ocean-going freighters can enter the Canal for shipments up the Great Lakes to the last day they can enter the Canal and return to the ocean before the navigation season closes. Otherwise the ocean-going merchantmen would be likely to be tied up inland for the entire winter and early spring season. At least 16 days would be required for the round trip. When this deduction is made it shows the navigation season to be approximately 228 days. In other words, the St. Lawrence Seaway would be open only 58 percent of the year.

The Seaway as a Power Source

It is stated by proponents of the project that a great shortage of power exists in the State of New York. They justify the St. Lawrence project on this ground. On a strictly cost comparative basis, and if the power portion of the project was divorced from the Seaway portion and if it was constructed in accordance with the demand for power, it could compete successfully with equivalent steam-generated electrical energy in upstate New York.

However, it is not separated from the ruinous Seaway Project and it is proposed to develop the full power potentiality there. This is an extremely dangerous course to pursue because of the very high first cost of the power works. If there is not a demand for the energy—and there would not be for many years to come—the carrying charges of such an expensive undertaking are very likely to accumulate to such an extent that the project would never pay.

Actually, it is not economical, even assuming a demand for power, to transmit St. Lawrence generated energy to New York City or to Buffalo. In those two sections of the state it would be cheaper to generate energy with modern highly efficient steam-generating plants. If there is not a sufficient demand to absorb the entire firm output of the St. Lawrence then it would be cheaper to meet the demand through modern, highly efficient steam-generated units even upstate.

On both sides of the border at Niagara Falls there are idle hydro-electric generating plants. On the American side an increase of 190,000 horsepower could be made by merely turning on the water. The plants are existing, all of the machinery and equipment is there and ready for use. On the Canadian side about 150,000 horsepower could be developed by the same procedure. Thus 340,000 additional horsepower is available at Niagara Falls right now to meet any emergency. All that is necessary in order to utilize this potential energy is to have the President authorize somebody to turn on the spigot.

If we need power in excess of this amount for national emergency purposes the practical way of obtaining it would be through the construction of steam-generating units located in areas where there is a demand for the power, or—in the case of the alumi-

(*Continued on page* 38)

Wire Rope Constructions and Their Application

By WALTER C. RICHARDS
A. Leschen and Sons Rope Co.

Wire rope represents a considerable item of materials expense in most mining operations. An understanding of wire rope constructions and the types of use to which each is best adapted aids in the selection among the various constructions to give longest life and trouble-free service.

THE applications of various rope constructions will be considered in this article. There is usually a best construction for every type of machine and class of work, but this does not mean that each machine takes a different rope.

The word *construction*, as applied to a wire rope, refers to the makeup of that rope. It is the rope specification and identifies it to all who are on familiar terms with wire ropes. It is usually assumed to include the complete description of any rope, but the word is also used in conjunction with individual items of the specification. For example, one hears Lang's Lay construction, Seale construction, 6 x 37 construction, flattened strand construction, and preformed construction, but these are only partial descriptions.

The dictionary defines "construction" as a process, structure, or arrangement, so in a sense the above expressions are correct. It would seem logical and proper, however, to apply the word only to the "arrangement" of the wires in a strand, and the "structure" of the rope comprising the strands and centers. The various lays of a rope could very well be referred to under that specific heading. Preforming is a "process" which can be applied to practically all constructions, and "round strand" and "flattened strand" are forms of rope, resulting from the different shape or cross-sectional outline of the strands.

The 'Lays' of Rope

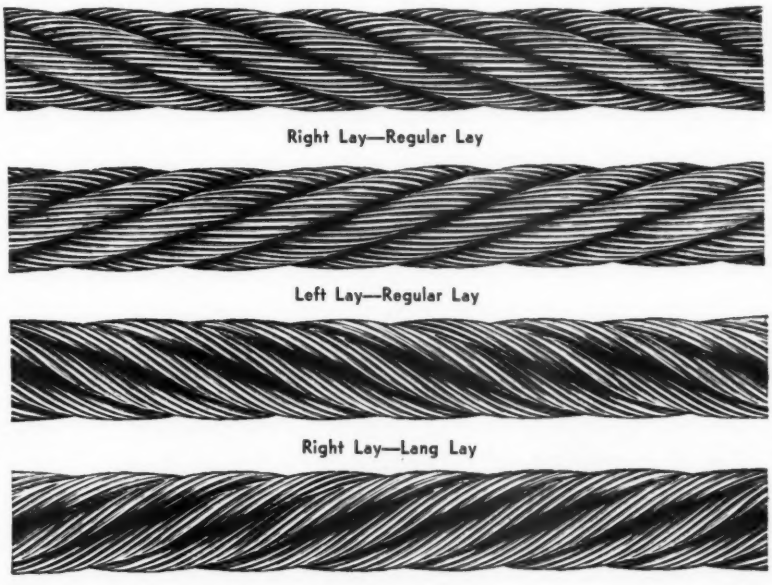
Under the heading of rope lays we have regular and Lang's Lay ropes, either of which may be right lay or left lay.

The "lays" have to do with the direction in which the wires and strands are twisted. A right-lay rope is one in which the strands turn to the right as they go away from the observer, as the threads on an ordinary screw. A left-lay rope is, of course, one whose strands are twisted in the opposite direction—to the left. A regular-lay rope is one in which the wires in the strand are twisted opposite to the direction in which the strands in the rope are twisted. In a Lang's Lay rope the wires in the strands are twisted in the same direction as the strands themselves. The regular-lay closure produces a rope in which the wires are exposed for a comparatively short distance on the outside of the strand, and in a direction parallel to the axis of the rope. A much greater length of wire is exposed in the Lang's Lay, which is desirable for certain kinds of work, and the direction of the wires is at a considerable angle with the rope axis. A combination of lays, called reverse lay, has three alternate strands right lay and three left lay.

There Are Several Types of Centers and Strands

There are three kinds of centers in general use; the hemp center, wire-rope center, and metallic core or strand center. The hemp center is a solid fibre rope, and the wire-rope center is a complete wire rope. A metallic core is but a single strand composed of approximately the same number of wires as the outside strands. The hemp center is used in most cases, but where high temperatures, crushing, etc., are encountered, a steel center is needed.

In form the twisted rope may be either round strand or flattened strand. The round-strand rope is most fa-



Right Lay—Regular Lay

Left Lay—Regular Lay

Right Lay—Lang Lay

Left Lay—Lang Lay

Fig. 1. Types of lay for wire rope are designated as regular and Lang's

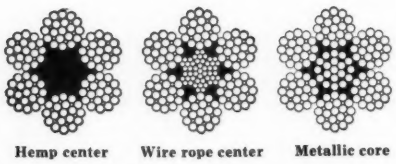


Fig. 2. Three types of core or center of wire rope include hemp center, wire rope center and metallic core

miliar because of its very general use, but there are some situations where flattened strand, due to the triangular form of the strands, is peculiarly well suited. Preforming is a process in the fabrication of wire rope, designed to impart certain desirable characteristics to the rope so made. The preformed rope is free from internal stresses when not in use, because the wires and strands have been shaped to the positions they occupy, and will not tend to spring away from each other. The tendency to kink is lessened, and the resistance to fatigue, caused by bending around small sheaves and drums, is increased. The rope is easier to install and safer for the men handling used rope.

Wire Arrangements

We now come to the particular subject and meaning of construction of wire arrangement. The number of wires varies from the usual 7 in each strand for haulage rope to 61 or more in the most flexible hoisting rope. There is a continual conflict between fatigue and abrasion, to see which will first destroy the rope. Abrasion calls for large wires and greater wearing surface; fatigue is best resisted by the use of small wires. No one construction is most resistant to both, but the attempt to design one that would be the best compromise under given sets of conditions has resulted in the many constructions now in use.

The simplest arrangement of wires in the strand is six around one, and this one-layer grouping is also the stiffest and most resistant to abrasion, but not fatigue. To obtain a more flexible rope 12 wires laid around the 6, then 18 more, making a 37-wire rope. For an extremely flexible rope the wires in the strand are increased by a layer of 24, making a 61-wire strand, which offers very little resistance to abrasion. This is simple arithmetical progression. There are many other combinations of wires and theories followed, with the hope of producing the same results.

The 19-wire strand, 12 over 6 over 1, is the most general all-purpose wire arrangement in use, and represents a workable average. Originally this strand was composed of 19 wires of one size. Filler wires were first introduced into the strand in this country about 1866. With fillers, this strand is made in one operation, instead of two, as is the case with the strand of one size wire.

Warrington construction was first described in a book brought out by the Warrington Rope Works of England, about 1888. In it the 12-wire layer is composed of two sizes of wire laid alternately. It was presumably an improvement over the one-wire size, and was developed independently of the filler-wire construction, as this latter was not yet in use in England.

Seale construction, another variation of the 19-wire strand, was patented by Thomas Seale in 1885. In the 19-wire construction it is formed by laying 9 wires over 9 over 1, although the patent describes a strand of 12 wires over 12 over 7. In most cases these seven wires are replaced by one. This rope was brought out as a better cable "for propelling cars on the endless-cable traction-railways" operating in San Francisco, Calif. Because it was subjected to "many strains . . . in addition to general tension strain . . . over and under and around many drums, guide sheaves and pulleys." "The great force and pressure applied by the gripping device" was another destructive element that this construction was designed to withstand. The patent applies to two layers of wires of equal number around one center wire, or a 7-wire core. All the wires of the inner layer are of one size, and all the wires in the outer layer are of one size, although of larger diameter than the wires of the inner layer. Those in the outer layer lay in the interstices of the wires of the inner layer.

Arrangements for Flexibility

Layers of wires of the same lay produce strands of greater flexibility than layers of wires of reverse lay. Seale, Warrington, and Filler Wire are the terms used to denote these three wire arrangements, and they apply not only to strands of 19 wires but to similar arrangements in other strands composed of both a greater and lesser number of wires. These names are easy to remember and associate with these wire arrangements, and their very simplicity commends their general use. Filler wire rope constructions are also frequently referred to

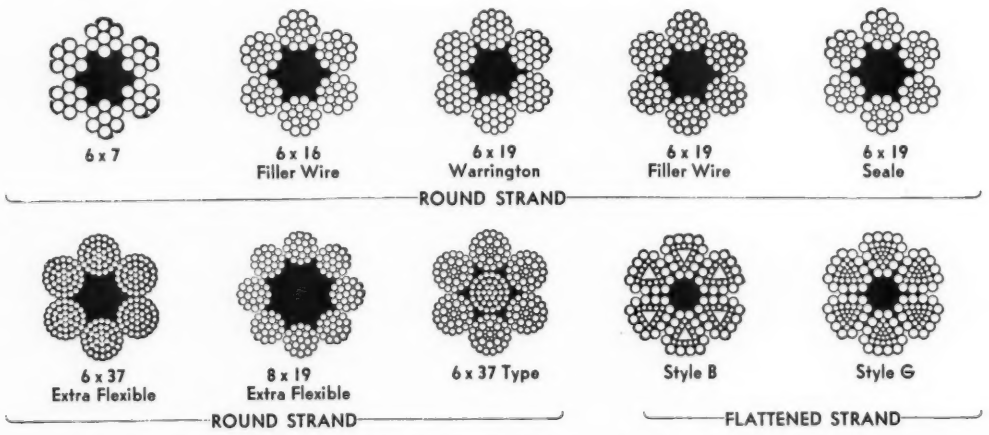


Fig. 3. Types of strand construction for wire rope most commonly used. Numerals, such as 6 x 7, mean a rope of 6 strands each containing 7 wires

as Modified Seale and Spacer Seale. And again it is this writer's personal opinion that the designation of rope constructions can be greatly simplified if the filler wires are not included when giving the wire count. A 6 x 19 is a well-known construction, but the filler wire form is sometimes referred to as 6 x 25. It would seem to be more understandable to say 6 x 19 filler wire, or 6 x 19 with 6 fillers; and, in the case of other construction, 6 x 16 with 5 fillers, 6 x 22 with 7 fillers, etc.

Flexibility is improved also by arranging the wires in a number of other combinations, and in some cases a fair degree of abrasive resistance is secured also. We could have a number of filler wire ropes, such as 1-5-10 with 5 fillers, 1-6-12 with 6 fillers, 1-7-14 with 7 fillers, 1-8-16 with 8 fillers, and so on. Warrington and Seale types would be represented in the same wire series as the filler wire. The Warrington type, which has wires of two diameters, alternating in the second layer, is designated as 1-5-5/5, 1-6-6/6, 1-7-7/7, and 1-8-8/8; and the Seale type as 1-5-5, 1-6-6, 1-7-7, 1-8-8, 1-9-9, 1-10-10, etc. All such wire combinations, however, do not lay together to the best advantage.

Type of Rope Must Be Adapted to the Service

We cannot give here a list of rope constructions that are best suited to a given list of machines, though we will call attention to the general types of ropes that are best suited for given conditions. One machine requires a flexible rope, another one that resists abrasion, another one that resists crushing. We have the two main divisions called haulage and hoisting ropes; one with coarse wire to withstand dragging over the ground, the other with fine wires for bending around sheaves. A 6 x 7 and 6 x 19 Seale are the round strand haulage ropes, and 6 x 8 in the flattened strand, although in the larger sizes 6 x 25 flattened strand makes a very good haulage rope. The usual hoisting ropes are 6 x 19, 6 x 37 in the round strand, and 6 x 25 flattened strand.

Selecting a rope for a given situation is not as easy as this, however. There usually is a little of this or a little of that, which complicates the problem. Past experience may indicate that more attention should be paid to the flexibility of the rope than its wearing quality, or vice versa. Some work will require this adjustment to a greater degree than other work, and to meet these variable conditions many constructions have been proposed and tried. Some think a new construction must be found for every situation, so we find that as among many there is very little, if any, advantage. Thus we have many constructions and resultant confusion, where fewer would cover the range and be just as satisfactory.

As mentioned before, rope with a hemp center is used most frequently, but for shovel and dragline excavating, and other so-called heavy-duty work, and for hoisting or conveying in the presence of furnace heat, a steel center is necessary. Whether this should be a wire rope center or a metallic core depends on the diameter, and details of the operation.

There is hardly an industry or manufacturing plant of any size that does not use wire rope to some extent, and many could not exist if it were not for wire rope. Working conditions which in many cases are difficult cannot be changed to suit the rope, so the rope must be selected best to suit the conditions. Some purchasers, however, operating a variety of equipment, think it best to buy only one or two constructions, and make them do for all, instead of buying a number of different ropes which would individually be better suited. A certain amount of rope service is necessarily sacrificed by following this scheme, although some trouble may be saved because workmen cannot always be depended upon to apply the ropes correctly.

Certain types of equipment are sometimes assumed always to operate to best advantage with a given rope construction, but that is not always the case. It is found that varying working conditions demand occasional changes in rope constructions, and therefore we often find a machine in one location or industry using a different rope from one in another location. However, some of this apparent inconsistency is due to the personal preference of the users.

The preforming of rope adds no new constructions, but it makes the rope more amenable to exacting conditions; it increases the flexibility. It renders the rope less subject to kinking and other damage caused by improper handling and operation. It should not be assumed, however, that any preformed rope, regardless of construction, is better than all non-preformed ropes. The same care should be used in selecting the proper construction in a preformed rope as in a non-preformed rope.

A Lang's Lay rope is frequently preferable to a regular-lay rope of the same construction, because the greater length of the individual wires provides greater resistance to abrasion. The flattened strand has this advantage to an even greater extent, as the outer strand surfaces conform more to a circle than in the case of the round strand rope. The flattened strand rope is also a stronger rope, size for size, and this, together with its resistance to abrasion, makes it the preferable rope in many cases.

On any job where the operator thinks rope service could be improved, he should consult the rope manufacturer. Possibly a change in rope construction would help, but on the other hand the machine may be at fault, and a jump to some different rope should not be made without consultation. On a new machine it may be necessary to try several constructions before the one best suited is found. The operator can see that great care is used by the manufacturer in providing a rope that is best suited to the machine. This is only the beginning and it is then up to the operator to take care of it.

1,000-Ton Tungsten Mill Built

The United States Vanadium Company, a subsidiary of the Union Carbide Company, will soon place in operation a tungsten concentrating plant with a capacity of 1,000 tons per day at Pine Creek, near Bishop, Calif. It is said that there is enough ore blocked out to keep the mill operating for 20 years and a prospect that enormous supplementary deposits will be developed.

The workings of the company are at elevations from 10,000 to 12,000 ft. The mill is located at an altitude of 8,000 ft. and soon it is announced a two-mile tramway will be built to connect the mines and the mill. A complete new camp will be built to accommodate a working force of 375 men.

Big Dredge for Caribou Creek, Alaska

News has come from Alaska that a large dredge weighing 650 tons, with lumber, oil products and other supplies weighing 350 tons are being trucked from Fairbanks to the property of the Brinker-Johnson Mining Company property on Caribou Creek, a distance of 89 miles. The property will be put in production as soon as this equipment is erected and installed.

Left: A view of San Francisco and the bay from the Fairmont Hotel, Convention Headquarters

Metal Mining Convention

Plans Maturing

ANNOUNCEMENT by W. C. Browning, Chairman of the Western Division, American Mining Congress, indicates that plans for the Eighth Annual Metal Mining Convention and Exposition, to be held at the Fairmont Hotel, San Francisco, September 29-October 2, will get into full swing with a meeting of the National Program Committee in San Francisco on June 24. Under the direction of General Chairman James W. Wade, Vice President and General Manager of the Tintic Standard Mining Company, the State Chairmen and committee members will review the great number of suggestions which have been made for convention topics, and outline a program covering the most outstanding of the industry's problems.

The coming meeting promises to be one of the most important gatherings of metal mining men ever held, in view of the particular emphasis which will be placed upon the industry's role as the backbone of national defense. "Metals for Defense" has been chosen as the theme of the Convention and Exposition, and the problems of operating under present emergency conditions will be thoroughly reviewed. Special attention will be given to the legislative, economic and tax situations of today, with increased emphasis also being placed on practical operating problems.

Arrangements for manufacturers' exhibits of mining equipment and supplies already have taxed the capacity of exhibit space at the Fairmont Hotel, and a number of outdoor exhibits of heavy machinery and equipment will be located on the street directly in front of the hotel. These comprehensive exhibits will afford executives, engineers and key operating men full opportunity for study and comparison of the latest aids to production available.

All convention plans, other than the program, are being formulated by a group of active committees headed by P. R. Bradley, President, Alaska Juneau Gold Mining Company, as General Chairman of the Arrangements Committee. Assisting Mr. Bradley are Albert F. Knorp, Gold Producers of California, as Vice Chairman, and Committee Chairmen as follows: *Ladies Committee,* Mrs. F. W. Bradley; *Reception Committee,* Wm. S. Boyd, Vice President, Nevada Consolidated Copper Corporation; *Finance Committee,* F. C. van Deinse, Vice President, Yuba Consolidated Gold Fields; *Entertainment Committee,* Errol MacBoyle, Executive Vice President, Idaho Maryland Mines Corporation; *Publicity Committee,* Chas. H. Segerstrom, President, Nevada-Massachusetts Company; *Attendance Committee,* F. W. Nobs, Vice President, Empire Star Mines Co., Ltd.; *Trips Committee,* Henry W. Gould, President, H. W. Gould & Company.

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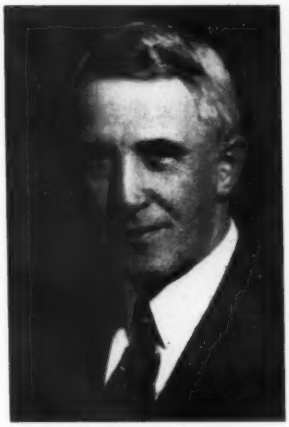
Excess Profits Tax Legislation*

● ***Mining Congress sets forth need for amendments to existing law; opposes Treasury's most recent proposals.***



By HENRY B. FERNALD
Chairman, Tax Committee
American Mining Congress

The American Mining Congress, on behalf of the mining industry, continues to urge adherence to the basic principle of excess profits taxation which was accepted in substance by the Congress last year and was reaffirmed by the adoption in March of the 1941 Amendments. That basic principle is this: While an excess profits tax may properly be imposed during this period of emergency on profits in excess of a fair normal standard, it must not be imposed, directly or indirectly, on what are truly normal profits. This should not be done deliberately by arbitrary definitions or formulæ for the purpose of raising revenue, nor should it be done unintentionally or inadvertently through technicalities of the law.

Much in the statement of the Treasury, submitted by Assistant Secretary Sullivan only serves to emphasize the vital importance of fair and reasonable determinations of what constitute excess profits to be subjected to an excess profits tax. The more determined we are to impose extraordinary taxes upon excess profits arising out of the emergency, the more certain we need to be that such taxes do not fall upon normal profits. Every argument for an excess profits tax law, with its extraordinary rates, fails completely if, through arbitrary, unfair definition, such rates are applied to normal business profits. Our primary problem, therefore, is to determine what are fair normal profits.

Standards for Determining Normal Profits

There is no rigid standard of normal profits to be applied to all lines of business or to all companies in a particular line of business. The element of risk involved will vary; the experience, ability and energy of those engaged in business will not be the same in different enterprises; and the capital requirements will not be uniform.

In practical life we look at the particular situation of each separate enterprise to determine the fair profit to be expected therefrom in view of all the circumstances. In a taxing statute, however, it is necessary to lay down general standards and measures in order to make the statute workable from an administrative point of view.

In our present excess profits tax law we have attempted to give recognition to the basic principle (that is, that normal profits should not be subject to excess profits tax) by allowing a credit based either on prior earnings or on invested capital. In addition, we have properly recognized that neither of these two standards can be relied upon for equitable treatment to all taxpayers, and have made some provision for special relief in meritorious cases. This basic structure should be retained and amendments should be made thereto in order to eliminate certain inequities and hardships which are largely the result of arbitrary or technical definitions and restrictions.

The corporation which earns no more than its demonstrated earning capacity in years prior to the present emergency cannot be said to be earning more than a normal profit. In the mining industry, as in others subject to severely depressed conditions in the period prior to the emergency, the average profits of the years 1936 to 1939 do not fairly measure normal earnings. Even in cases in which the years 1936 to 1937 might be considered representative of normal profits, the year 1938 was apt to be a very poor year (often a year of loss), and 1939 was subnormal. In many cases, not even the years 1936 and 1937 gave rise to normal income. In any event, it must be conceded that the demonstrated earnings of this period are a minimum requirement in ascertaining a fair normal profit.

It should also be recognized that no corporation has excess profits unless its profits are in excess of a fair return on its capital employed. This is true whether or not the taxpayer is engaged in defense program activities. The test based on invested capital may be grossly inadequate in many cases but it does furnish a negative standard, in that profits which are not in excess of a fair return on capital are not excess profits.

The Assistant Secretary has presented to you a recommendation that invested capital should be made the sole standard for an excess profits credit. With this recommendation we profoundly disagree. He proposes an allowable rate of return determined according to the ratio of earnings to invested capital during the base period with a minimum of four percent and a maximum of 10 percent.

We were opposed to such a plan last year and are opposed to it at the present time. We cannot judge whether profits are excess profits by looking simply at a percentage of a somewhat arbitrarily defined net income to a very arbitrarily defined invested capital. Profits are not necessarily excess profits because the net income represents a relatively high return on invested capital. We recognize, for example, in section 725 that some corporations, in which capital

* Presented at hearings before the Committee on Ways and Means, U. S. House of Representatives, May 26, 1941.

is not a material income producing factor, should not be subjected to the excess profits tax. Other corporations which do not strictly come within the provisions of this section are subject to this tax even though capital is not a material income producing factor. Thus we subject to the excess profits tax corporations which run the whole scale from those in which capital is the major to those in which it is a negligible income producing factor. Somewhere along the scale we certainly reach the point where a percentage on capital cannot be considered a fair measure for determination of excess profits. Hence the use of invested capital as the sole test results in many instances of gross unfairness and violation of the basic principle that normal profits should not be subjected to the excess profits tax.

The Assistant Secretary has well stated, "...if business is to expand and investors are to put money into new corporations, an opportunity must be allowed to earn an adequate rate of return on new capital." Again, "Any maximum return on capital must be a somewhat arbitrary figure because businesses differ widely in the degree of risk they face. Accordingly, it is desirable not to set too low a maximum rate of return."

He has thus emphasized the importance of allowing new capital to earn an adequate rate of return. We agree that this is essential. Fair treatment to new capital should not, however, involve any discrimination against old capital. While large amounts of new capital are required in the defense program we need desperately to have the fullest effort possible from now-existing enterprise. We must, therefore, place existing enterprise on a footing comparable with that which new enterprise would have. The business which can use present property and organization to meet defense requirements should have the same allowance made to it as would be made to a new enterprise providing equivalent facilities. So the fullest support of the principle of allowing fair return to new capital should not mean discrimination against or less favorable treatment of existing enterprises.

Invested Capital Cannot Fairly be Made the Sole Standard

The main reasons advanced by the Treasury for its proposal to use invested capital as the sole standard, with allowable rates of 4 percent to 10 percent, seem to be: (1) that such a tax would yield more revenue; (2) that it would impose a tax upon certain corporations handling defense contracts which otherwise would not be required to pay an excess profits tax; and (3) that it would give greater simplicity than the present law. None of these arguments are valid, for the following reasons:

(1) We must not look on the excess profits tax as primarily a revenue measure. Having formulated as fairly as we can a tax to reach only excess profits, it is necessary and proper then to make estimates of probable revenue to be derived from it, always recognizing that such revenue is only to come from what are really excess profits. If we could achieve the ideal situation in which our entire defense program would result in no excess profits to anyone—directly or indi-

Treasury Building, Washington, D. C.

rectly—then we would expect no revenue from an excess profits tax. We can no more test the success of an excess profits tax law by the amount of revenues it yields than we can test an anti-narcotic law by the amount of fines imposed for violations. If there were no violations of the narcotic law, there would be no fines. It is not the revenue from fines but rather absence of violations which we desire. Admittedly, complete absence of excess profits is an ideal condition we cannot hope to attain. Undoubtedly, there will be some who will derive, from government contracts or otherwise, excess profits which should yield revenue to the Treasury, but the smaller the amount of such excess profits, the better we shall be pleased. So we should not distort the excess profits principle by making revenue its main objective.

(2) As to taxing profits from defense contracts, we must not be led astray by looking merely at the dollar amounts of such contracts which any concern may be handling as being in itself an indication of excess profits. Surely, it is not intended to penalize or discourage those who are or might be cooperating in the defense program. We want all who can, to take these defense contracts and handle them efficiently, expeditiously and fairly to meet our urgent needs. It would be fatal to discriminate against those who cooperate as compared with those who cannot or will not help to meet direct defense requirements. There should be no assumption that government contracts are intended to yield excess profits. For these reasons we must not regard the fact that any particular corporation does or does not have government contracts as indicating whether it should or should not be subjected to an excess profits tax. If a corporation will take $70-million or $250-million of government contracts and handle them properly and efficiently, with no more than a fair and reasonable profit on that business, it deserves commendation, rather than criticism and penalty. The sole objective of the excess profits tax should be to impose such a tax on excess profits. If there are no excess profits, the tax should not apply.

(3) Simplicity is not achieved by the Treasury's proposal.

The greatest difficulty, confusion and uncertainty in the present law are with respect to determination of invested capital. Much of the uncertainty under Sections 112 and 113 of our income tax law is brought into the invested capital definitions of the excess profits tax law. Other baffling complexities are added by special provisions or formulæ of that law. What we have is a mass of interlocking, often conflicting, arbitrary formulæ and rules to be interpreted and applied.

Moreover, as we pointed out last year, the Treasury's plan for variant allowances based on the ratio of earnings to invested capital for the four years of the base period is anything but a simple rule to apply. It involves all the factors required for determination of base period earnings and adds to this the greater difficulties of determining the average invested capital for the base period. Under such a rule we have to determine invested capital not merely for one year but for five.

However, even were simplicity accomplished, it would not justify grievous unfairness in a tax law. When tax rates are high, differences, unimportant when rates were low, may become serious discriminations. The fact that a rule may be fair in many, even in a majority of cases, will not mitigate its disastrous consequences in situations where it is not a fair and proper rule to apply. It is no satisfaction to the small mines of the west to know that a tax which may be ruinous for them will work out fairly for many other enterprises. If a few men have spent years of work and self-denial to develop a successful mine, they will not listen very patiently to an argument that, since they have no material amount of an arbitrarily defined invested capital, practically the entire product of their life work will be treated as excess profits and taken from them. Their grievance will only be intensified if they are told that this results from the desire to adopt a simple rule which works quite fairly in many other cases.

One of our serious difficulties in considering the relation of invested capital to excess profits is the arbitrary definition of invested capital in the present law. Although there must be some arbitrary elements in every tax law, the fact remains that it is wise policy to recognize the extent to which a law is arbitrary and make such remedial or relief provisions as will avoid gross injustices.

Under our present law, two corporations similarly circumstanced as to property, business and profits, may have greatly different allowances for invested capital. One may have two or three times the amount of invested capital which is allowed to the other, since the amount of invested capital allowable under this law may depend upon fortuitous circumstances of the past which have no relation whatever to a determination of any standard of fair profits on business today. The technical form of a reorganization, adopted with no contemplation whatever of a possible excess profits tax, may vitally affect the invested capital allowance. One corporation may have to go back 50 years to determine its invested capital. Another may use a practically current basis. Accordingly, while we may say that no corporation has excess profits unless it has a fair return on invested capital, we cannot say that any corporation has excess profits because it earns more than a stated percentage on an arbitrarily defined invested capital, which is wholly inadequate as a measure of the value of assets now employed in the business.

Normal Earnings Should be Fully Recognized

The Assistant Secretary has said: "Profits in excess of a necessary normal return on invested capital, even if this return was being earned in the years prior to the defense program . . ." are profits that can properly be subjected to special taxation. He also said: "The existence of such profits, while often due primarily to good management, is in numerous cases due to monopoly, imperfect competition, or fortunate circumstances, and not to any outstanding service to the public. When as a result of the imperfections of our economic machinery such excess profits have been made, it is equitable and desirable that they be subjected to special taxation. Furthermore, at a time when heavy taxes must be imposed they should be levied where they will assist best in maintaining a well-functioning economy."

Let us test this thought as applied to the kind of situations we currently meet in business life. Consider corporation "A," formed by a group of men who have ample funds available to them. They see that to conduct the business expected they should have a corporation with a million dollars of invested capital and they so proceed. This corporation, let us say, does $5,000,000 of business and makes $70,000 after income tax. This is less than 1½ percent on the

gross business. It is 7 percent on the invested capital and we rightly say this corporation has no excess profits. We make no criticism of it on the ground that its profits are due to monopoly, imperfect competition or fortunate circumstances.

Next consider corporation "B," formed by a group of young men who do not have large capital at their disposal. They are energetic, hard working, able and resourceful. They establish confidence in themselves and get satisfactory credits from suppliers and others. So we will assume they also are able to do a similar $5,000,000 a year of business with a net profit of $70,000 after income tax. All the capital they were able to put into the business was $250,000. So they have an invested capital credit of only $25,000 plus $5,000 exemption, leaving to them so-called excess profits of $40,000. This we will recognize as one of those cases where profit in excess of a limited rate on actual capital invested is "due primarily to good management," understanding that term to include all the abilities and qualities which these men, in addition to money, have put into their business. Yet with the suggestion that the profit may be due to monopoly, imperfect competition, etc., or that in some other cases profits might be due to these causes, the Treasury would condemn corporation "B" to a heavy discriminatory tax. I do not need to argue with you whether such taxation "will assist best in maintaining a well functioning economy." None of us want to see such men penalized because they had put all that they had, which did not happen to include much money, into the business in supplying to the public goods or services desired at prices the public was glad to pay, in furnishing employment to labor and generally in contributing to the welfare of their communities.

We recognize that throughout our country, there are businesses which were started many years ago by these small groups of men without large resources and which over a period of years have developed and prospered. Sometimes they furnish the major source of employment in their communities. Although their earnings may represent a larger percent on their statutory invested capital, certainly they should not be penalized and they should be encouraged to continue their normal operations.

You all know such businesses where profits which were more than a limited percentage on invested capital are not to be considered as due to monopoly and imperfect competition, but the corporations earning them are of the very kind we want in order to maintain a well-functioning national economy. We cannot try to distinguish in our tax laws between profits which we think are desirably and properly earned and those which we think are derived by methods or from businesses of which we do not wholly approve. Certainly we will not obtain desired objectives by dealing harshly with the types of businesses we most want in order to deal drastically with some few we think are not so desirable.

I have spoken of business in general but I wish again to revert to mines. I know you will agree with me that those with little money, who have put their very selves into the enterprise to make a mine successful, should not be discriminated against. Those from the mining sections know that a single successful mining venture may be all some men will have to show for a life-time of endeavor. Because they have brought the hidden metals from the earth to make them available for the use of men and have served society and the public good, as we well realize today when the very existence of our nation may depend upon an abundant supply of these metals; because men have put themselves rather than money into an enterprise; because they could use their reputations and honor to obtain credit instead of investing dollars they did not have, they should not be discriminated against as they would be if the dollar amount invested were made the sole standard for an excess profits credit.

Some Difficulties in Determining Excess Profits

We recommend various changes which would tend to make invested capital a somewhat fairer measure than is prescribed by the present law, and we urge the adoption of these amendments. Yet, even with these changes, we cannot reach a definition of invested capital which will make it fairly the only measure to be applied in determination of excess profits. We must still have adequate provisions to be applied where invested capital is not the major income-producing factor. The standard of base-period earnings must be retained, but even its use will not give relief from inequity to those who did not have normal earnings during the base period. There must be the special relief provisions to avoid unjust imposition of an excess profits tax on what are not truly excess profits. The higher our tax rates—whether of income, excess profits or other taxes—and the greater the accumulated load of taxation, the more imperative is the need for fairness and equity in determining the basis of taxation.

A major difficulty in trying to determine what are normal and what are excess profits, is to distinguish fairly in all cases between what is really a profit from capital and what is simply a return of capital.

Some recognition of this is given in the law by its provision for amortization of special facilities, but that provision, as it stands, is probably not adequate, even as to that special feature. The law evidences the intention in other ways to give recognition to special situations where net income, as normally defined, is not a true basis for determination of excess profits. Yet, probably no specific provisions can be written into the law which would adequately provide for all the special situations where net income as defined by the law fails to make adequate allowances for return of capital under all the risks and uncertainties of business, particularly in an abnormal period. If an investment will prove valueless or largely valueless after a few years, we have not fairly measured our element of profit unless we have permitted enough to be set aside to cover fully the shrinkage in value of the investment. Admittedly, this is difficult. Perhaps it cannot be done completely; yet it is an element that must be taken into account in determining excess profits.

We have also given recognition in the law to the fact that a single year's profits do not constitute a fair basis for determination of excess profits. We have provided that an unused excess profits credit may be carried forward for two years. We have not made the provision which should be made, to allow subsequent losses or deficiencies to be applied against excess profits of prior years. There are good reasons to believe that we will face, at the close of this emergency, much the same situation as we did at the end of the former war, when the apparent profits of prior years were wholly or largely wiped out by post-war losses. No business can devote its plant and equipment, and its energies,

largely or wholly to emergency requirements and then expect to switch over immediately and easily to its normal business at the close of the emergency. It is probably impossible to provide adequately in the present tax laws for this situation, but it is vitally important that some reasonable allowances should be made for it.

Amendments Needed

The American Mining Congress urges that the general plan of the present law be retained, allowing an invested capital credit or an average earnings credit, with provisions for special relief where neither of these two credits affords an adequate measure of normal profits. The amendments we urge to the present law are as follows:

I. As to Base-Period Income.

The years 1936 to 1939 were not years of normal profits. There was no year in that period when our Government was not continually directing its efforts toward obtaining higher business incomes in order to reach a desired normal standard. There was no year in that period in which profits could generally be considered excessive; so it would be fair to provide a credit based on income of the best year in the base period. If it is felt that more than one year must be taken into account, the credit should be for the average of the best two out of the four years. Under the conditions existing in the base period, this would be a reasonable minimum measure of normal profits.

The full 100 percent for such base period earnings should be allowed. An allowance of less than 100 percent is simply to make normal profits subject to the excess profits tax, which is a gross misapplication of the excess profits tax principle. Income which under Section 721 is attributable to a base period year should be included in the income credit.

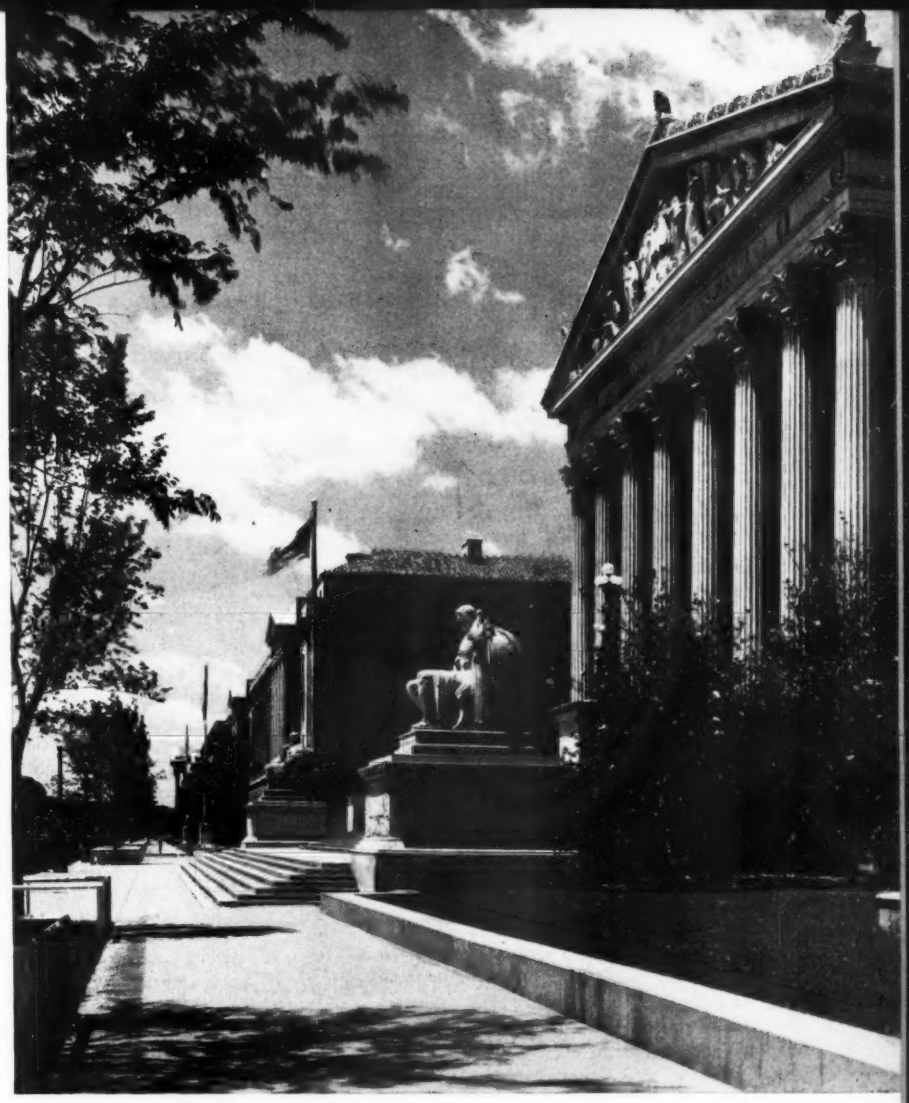
II. As to Invested Capital.

An equitable measure of the invested capital on which a fair return should be allowed would be the actual value of assets at the beginning of the excess profits tax period. Admittedly it is difficult to value all assets of business corporations as of this basic date. In many cases, however, it is easier than going back over many years to determine all of the intricate questions of fact and law required for computing statutory invested capital under the complicated provisions of the present statute. It would be a fair provision to permit the taxpayer to use the value of assets at the basic date where the taxpayer will take the burden of making satisfactory proof thereof.

Another possible means of simplifying the work of the taxpayer and of the Bureau would be to permit the use of the invested capital previously determined under the 1918 Act, brought down to date. Such a permissive provision would make it unnecessary to review and re-state all the details of transactions more than a quarter of a century ago, which had previously been considered and with respect to which an allowance for invested capital had been determined.

Actual cost to the taxpayer should be allowable in computing invested capital, with such limitations on transactions occurring after enactment of the statute as may be necessary to prevent tax avoidance. If the so-called tax basis is to be maintained, it should at least be that which is prescribed as the basis for computing gain (not the basis for computing loss), since the entire object of the invested capital computation is the determination of taxable gain or income. Where a substituted or adjusted basis for assets is used the adjustments to be made should be those appropriate to the basis used. "Sansome" earnings should be excluded rather than deducted. The present special provisions regarding dividends paid in the first 60 days of the year should be eliminated.

The definition of borrowed capital



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should be revised to include money borrowed on open account as well as on notes or other obligations and the full amount of borrowed capital should be allowed as invested capital.

III. As to Special Relief.

Provision should be made for special relief in connection with the invested capital credit as well as the income credit. There should be provision for allowance of a reasonable rate in excess of the specified 8 percent where the element of risk is high; and provision for fair adjustment where the statutory invested capital is not representative of the actual capital employed in the business. There should be adequate relief provision to cover those cases where capital is not a material income-producing factor, or is only one of a number of income-producing factors.

Low selling price of the product or low volume of sales and demand in the base period should be recognized as typical abnormal conditions, furnishing proper ground for special relief.

Provision should be made for special relief for new corporations in meritorious cases.

There should be no penalty tax imposed where special relief is granted. Adequate provision should be made to limit the amount of taxes required to be paid in the first instance, in cases where bona fide claims are made for special relief.

IV. As to Supplements A and B.

These supplements should be generally re-written. The law should state the principles to be applied and permit the Commissioner to apply these under proper departmental regulations. Specific formulæ inevitably work out unfairly in many cases.

There should be some extension of the provisions as to the corporations which may use the base-period income of prior ownership.

Section 742(f), which denies to a corporation credit for its own base period income before it became an acquiring corporation, should unquestionably be eliminated.

V. Other Important Amendments Required.

The schedule of rates should be based on a combined schedule of dollar amounts and percentages of excess profits as in the Senate bill of last year.

There should be further extension of the provision for an unused excess profits credit, particularly to provide for a carry backward as well as a carry forward of the allowance. The income tax before credit for foreign taxes should be the deduction in computing excess profits net income. Income from milling as well as mining strategic minerals should be exempt from this tax. There is no reason why gold and silver should be subjected to excess profits tax.

Section 734, regarding inconsistencies, should be reconsidered in its entirety and should be materially revised. In no event should it apply to more than six preceding years.

The Commissioner should be given full power to modify the requirements for daily computations of invested capital. The present law limits his authority to cases where the difference will be not more than $1,000 of invested capital, which will make at most a difference of $40 in the taxes involved. This may entail many times that amount of cost to the taxpayer and to the Bureau, when the Commissioner might readily agree on some much less burdensome but equally fair method of determining averages, if it were not for this limitation in the law.

Summary of Our Position

In conclusion we summarize our position as follows:

(a) The excess profits tax should not be deliberately or unintentionally imposed upon normal profits of a business. It should only apply to what are truly excess profits.

(b) No single standard is adequate for determination of normal profits.

(c) There are no excess profits unless profits are in excess of a fair return on capital employed with appropriate allowance for the risk, the energy, effort and ability required.

(d) There are no excess profits unless profits are in excess of demonstrated earning capacity in the base period.

(e) Even with both these provisions there is need for special relief to meet special conditions. We must have these three basic provisions which are recognized in the present law.

(f) There is need for amendment of the law to make its standards fairer and to avoid gross injustices in its present provisions.

The amendments which we feel are of particular importance to the mining industry are set forth more specifically in a special memorandum which has been filed for the record.

St. Lawrence Seaway

(*Continued from page* 28)

num industry in northern New York, by some arrangement for the importation of power from the Quebec power companies. Over 700,000 additional horsepower can be generated at Beauharnois by merely installing machinery in an existing power plant and dredging the power canal a little deeper. The dams and power canals and plants are there. And if even more energy should be necessary, a further 700,000 horsepower could be generated at the same station by merely adding on to the existing plant. There is not room enough in the present buildings to add equipment beyond the first 700,000 horsepower I mentioned. It is perfectly obvious that a really urgent demand for power does not exist. If there was an urgent demand, if it was essential to our rearmament program, certainly these power potentialities which can be developed immediately in the case of Niagara Falls and in a very short length of time at Beauharnois, would be used.

Yankee Girl Vein Found in Sunshine Consolidated

The discovery of the Yankee Girl vein of silver ore by the Sunshine Consolidated, which was made recently, opens new possibilities for the famous Coeur d'Alene silver belt, according to reports from Spokane. This discovery is the first of commercial ore south of the Sunshine vein, and also it is about 1,000 ft. south of any other known production area.

The Sunshine Company is reported here to have started a crosscut south on the 3,100 level that will cut the Yankee Girl vein about 1,500 feet east of the discovered crosscut.

The new crosscut is a development originating from negotiations between the Sunshine and Metropolitan Mining Companies.

Hammond Building New Breaker

The Hammond Coal Co. has started work on the erection of a new anthracite breaker at Shenandoah, Pa. The approximate cost of the plant will be $100,000 and the work will be rushed so that it will be in operation early next fall.

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

MANAGEMENT AND MAINTENANCE

By G. B. SOUTHWARD
Mining Engineer
American Mining Congress

A FEW days ago, in connection with the preparation of our 1941 Year Book, I was reviewing the papers and discussions presented at our recent Annual Coal Convention in Cincinnati. This proved to be a very interesting task, as the sum total of these proceedings gives a comprehensive cross-section of what is going on in the mines and minds of the industry.

To begin with, there were several things described which I had not known were being done. Some of these were new developments and others were in the nature of high performance records. Then, too, there was much said and written about the economic factors which determine the choice of equipment and the selection of operating methods. The number of studies of this type clearly demonstrates that the industry is getting away from trial and error methods, and that mining plans are being based on sound and proven economic principles. This trend is brought about by the fact that modernization has progressed to the point where accurate data are available for analytical use.

However, what to my mind was the most striking example of the new order, was the emphasis given to two subjects—management and maintenance. Mechanized loading naturally was the major theme; safety of course was stressed, and ventilation came in for more attention than in previous years but, in the papers and discussions and from the questions asked, it was clearly evident that proper supervision and proper care of equipment are being recognized as primary essentials for successful modern operation. This applies equally to deep mining and to strip mining.

Maintenance was separated into its various phases. The organization of crews and procedure for daily and periodic inspections and repairs were described, both for underground and shops; regular schedules for minor repairs and for complete rehabilitation are being adopted and, in this connection, quite a lot was said about welding. The importance of lubrication and the proper selection of the right type of lubricant for each class of service were clearly brought out, and it was stressed that proper lubrication would result in cost savings. Much attention is being given to methods of handling supplies to the working faces; schedules are being put in effect that avoid loss of time that results through failure to have materials on hand when needed.

The relation between power and maintenance was discussed by several speakers, who explained that excessive voltage drop not only adds to the cost of operation in slowing the rate of production, but increases repair costs through the burning out of armatures and insulation. Adequate carrying capacity for the underground transmission lines is the obvious answer. Then, in addition, there is often a direct connection between electrical and mechanical troubles; a mechanical breakdown may be due to electrical causes and, on the other hand, electrical failures may result from mechanical causes.

Management was also broken down into its various phases, ranging from the duties of the executives through to personnel training, and the responsibility of management in maintaining safety was particularly emphasized by a number of speakers. It seems to be the general agreement that the proper type of supervision is needed in maintaining favorable labor relations. The importance of detailed advance planning was cited as one of the best methods to decrease lost time, eliminate lost motion and lower production cost; in other words, anticipate what is going to be needed and arrange for it in advance.

The recognition of the importance of management and maintenance is bringing a new idea into the picture, which is personnel training, and particularly technical education. Of course, the idea of trained men for jobs and engineering graduates for supervision is not new—even in coal mining—but its widespread acceptance by the coal industry is a distinctly modern trend. A few years ago, when mechanized mining began to assume importance, several of the companies with mechanized operations began to recognize the need for technically trained men in their supervisory department, and it was then discovered that there was a decided dearth of young coal mining engineers entering the industry. With the exception of a few forward looking men, no one seemed much concerned about the situation, and it is surprising to see how, in the space of only two or three years, the industry as a whole has become "training conscious."

As stated above, mechanization was the major theme at Cincinnati, but as compared to conventions in previous years, it was the underlying thought rather than the direct subject. That is to say, the coal industry has adopted machines, and operating men no longer need to be given examples of how machinery is being used and what its advantages are. Its practicability has been demonstrated and accepted; the real concern now is to determine further how the machines can be used to the fullest advantage. The industry now realizes that management must discard hand loading viewpoints; mechanization is a new art, and new procedure must be devised because old ways cannot be adjusted to fit the needs of mechanical mining.

CARRYING CAPACITY OF INSULATED CONDUCTORS FOR MINE USE

● ***Part II of the Report Submitted to the Committee on Underground Power by A. L. Johnston. Part I appeared in the May issue, Mining Congress Journal.***

THE question has been brought up as to whether it would be feasible to prepare a set of complete tables showing similar values to the bare wire tables which would apply in case of insulated conductors, but after investigating the possibilities of such tables, it was found to be impracticable, owing to the many types of insulated conductors now available, and to the fact that there are so many code limitations as to where each particular type may be used.

There are also a great many apparent discrepancies in various tables prepared and published on this subject by the various wire manufacturers and, while the National Electrical Code devotes several chapters to this subject, these rules have reference to general house and commercial wiring only and therefore not apply in case of circuits installed for actual mining operations.

Under heading "Purpose and Scope" 1940 issue National Electrical Code, second paragraph, reads in part as follows:

"* * * It does not cover installations in mines, ships, railroad cars, automotive equipment, or the installation or equipment employed by a railway, electric or communication utility in the exercise of its function as a utility and located outdoors or in buildings used exclusively for that purpose."

The Code, however, does cover electric conductors and equipment installed within or on public or private buildings and other premises. In order, therefore, to comply with the Code rulings it is suggested that conditions and limitations imposed by the National Electrical Code be followed out in case of all residential and public lighting and power circuits (other than those used exclusively in mining service) even though located on privately owned property, in order not to invalidate fire insurance policies.

The following information is taken from the 1940 Code and refers to allowable current carrying capacity of conductors in Amperes, 600 Volts, Single Conductor in Free Air, based on room temperature of 30° C. (86° F.) and assumes a one-conductor wire or cable in free air isolated, and is based on maximum operating temperatures as follows:

For Code grade rubber (Type R) 50° C. (122° F.).

For performance grade rubber (Type RP) 60° C. (140° F.).

For heat resisting grade rubber (Type RHT) 75° C. (167° F.).

It will be noted from table No. 3 that the values, even in case of the heat resisting rubber type insulation, are considerably lower than those indicated on Tables No. 1 and 2 of this report and which show safe carrying capacity of bare conductors.

The ampere figures shown are based on temperature conditions only, and due consideration must also be given to the voltage drop caused by the length of the circuit.

For special purposes, there are many other types of insulated wire and cables now obtainable, such as varnished cambric, synthetic type, asbestos and varnished cambric, asbestos, slow burning, weather-proof, paper insulated, etc.—the maximum carrying capacities of which are limited by the heating effect of the conductor on the insulated covering.

Single and Multi-Conductor Portable Cables for D.C. Equipment

These cables are usually insulated for 600 volt service and may be secured in single conductor, 2-conductor concentric, 2-conductor round, or 2-conductor parallel types. Such conductors are utilized for carrying current from a central point (such as a junction box or other power source) to mobile equipment including mining machines, coal loaders, gathering locomotives, portable drills, etc. These types of portable cable have been developed to withstand the extremely severe service requirements encountered in mining operations either below or above ground, and meet the requirements of the I. P. C. E. A. The copper conductors are made in the form of flexible rope strands in order to secure greater flexibility without

Table No. 3—Maximum Current Carrying Capacity for Insulated Conductors

(Based on room temperature of 30° C. (86° F.)

Size AWG or CM	Rubber, Type R, 50° C. (122° F.)	Rubber, Type RP, 60° C. (140° F.)	Rubber, Type RHT, 75° C. (167° F.)
14	20	24	29
12	26	31	37
10	35	42	50
8	48	58	69
6	65	78	94
5	76	92	110
4	87	105	125
3	101	122	146
2	118	142	170
1	136	164	196
0	160	193	230
00	185	223	267
000	215	259	310
0000	248	298	358
250,000	280	338	403
300,000	310	373	446
350,000	350	421	504
400,000	380	457	547
500,000	430	517	620
600,000	480	577	691
700,000	525	632	756
750,000	545	655	785
800,000	565	680	815
900,000	605	728	872
1,000,000	650	782	936
1,250,000	740	890	1066
1,500,000	815	980	1174
1,750,000	890	1070	1282
2,000,000	960	1155	1383

(Values taken from Table 2, 1940 National Electrical Code.)

binding. Special 3 and 4-conductor portable mine and trailer cables are also available and can be furnished either with or without ground wires.

To take full advantage of the maximum capacity of the feeder conductors installed in mine work, it is essential that portable cables of adequate carrying capacity be used, as there has been a tendency in the past in a great many mining operations to use portable trailer cables that are totally inadequate to carry the necessary current. Reduced operating efficiency of equipment is always manifest in case of excessive voltage drop and this condition can only be overcome by using extension cables of the required size.

Portable single conductor 600-volt cables can be secured with plug and socket connectors (from one manufacturer) having vulcanized rubber jackets to equal the cable insulation. These single conductor cables with plug and sockets are available in 15 to 225 ampere capacity. Two-conductor parallel cables with plug and socket connectors are available in capacity up to 90 amperes. It is recommended therefore that for continuous service and where the current demands of the operating equipment are in excess of 90 amperes single conductor cable of proper size be used on account of the increased capacity available over that of the 2-conductor style.

A new type plug and socket type connector for 600 volt service using molded soft rubber insulation has been recently developed by another manufacturer. The current carrying parts are made of copper instead of brass to cut down resistance. These plug connectors can be furnished for three-conductor cables and are polarized to insure proper connections being made at all times. Each of the three separable contacts have a distinctive color marking which permits following out the Bureau of Mines recommendation of black for positive, white for negative, and red for safety ground.

The following information relative to current carrying capacity of various size single conductor 600-volt cable suitable for use on gathering reels and other applications in or around mines is taken from one of the recent Anaconda Mine Cable Publications.

Conclusion

The values used in compiling the tables and curves for the graphs included in this report have been either arrived at or taken from the latest available information pertaining to the various style conductors involved. However, many variables have been encountered in collecting and assembling this data and in determining which of a number of values applicable to temperature, resistance, carrying capacity of conductors, etc., would most nearly be representative of average conditions affecting trolley and power lines for mine work.

Table No. 4—Carrying Capacity for Single Conductor Cables

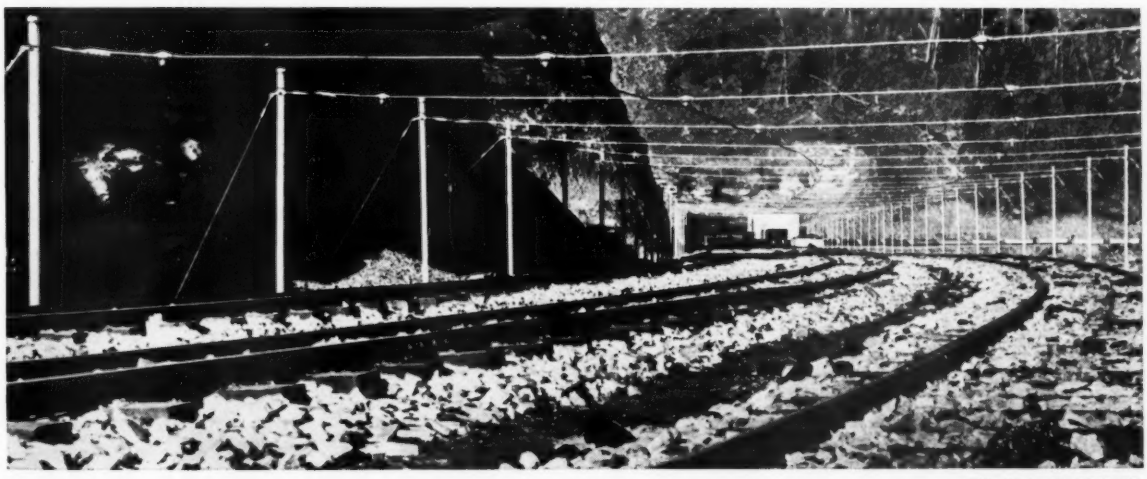
Size AWG	No. & size of strands	* Current carrying capacity, amperes	Approx. diameter overall, inches	Approx. ship. wt. 1,000 ft. (pounds)
8	49 x 25	45	.400	175
6	49 x 23	60	.500	250
4	49 x 21	85	.562	325
3	49 x 20	95	.625	395
2	133 x 23	110	.675	435
1	133 x 22	130	.750	570
1–0	133 x 21	150	.750	630
2–0	133 x 20	175	.800	750
3–0	259 x 22	205	.900	950
4–0	259 x 21	235	.950	1110

* The current-carrying capacity, as shown above, if used continuously will be reduced when such cable is used with one or more layers wound on a gathering reel. The reduced capacities are as follows:

One layer	.85 of specified value
Two layers	.65 of specified value
Three layers	.45 of specified value
Four layers	.35 of specified value

In case of 2-conductor, either round or concentric cable or 2-conductor parallel, the carrying capacities are also reduced somewhat over that of a single conductor cable of equivalent size.

Obviously it is not possible to cover in a limited space a complete analysis of every electrical distribution problem which might be encountered for some particular operation. It is felt, however, that sufficient general information has been included in this report to simplify the calculations necessary to meet any specific direct current distribution problem that might arise.



--THE KOPPERS COAL CO.

Outside haulageway—Kopperston Mine

THE MINERS' EXHIBIT

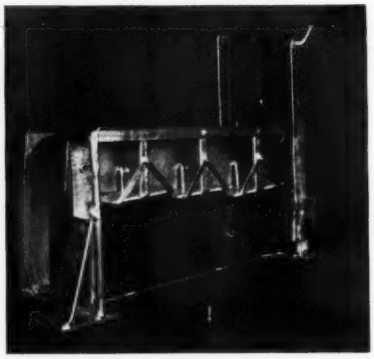
An interesting and educational feature at the recent Annual Coal Convention and Exposition of the American Mining Congress was the Miners' Exhibit—a display of gadgets and operating kinks originated by men at the mines. Coal Company employes were invited to take part in this exhibit, and a large number of ingenious ideas were on display, either in toto or by means of models and photographs. Prizes were awarded to ten of the displays which, in the opinion of the judging committee, were believed to have the widest scope of application. Photographs and descriptions of some of these prize winners are submitted here. Others will appear in the July issue.

\+ + +

Adjusting Walkway for Loading Boom Picking Table

Submitted by E. L. SALYERS
Wise Coal & Coke Corp.

This device is an automatic adjusting walkway which is located alongside a loading boom so that the latter can be used as a picking table. It is not attached to the loading boom

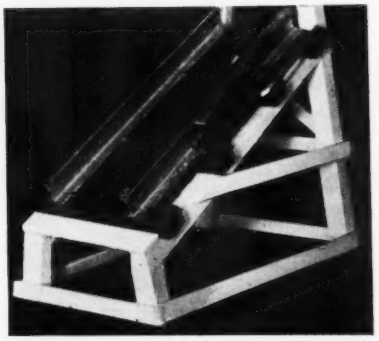


but, by means of rope and counter weight, the walkway will automatically follow the up and down movement of the boom. The walkway can thus be utilized as space for additional slate pickers, to remove impurities as the coal passes along the boom.

Automatic Incline Limit Switch

Submitted by ROBERT W. FORTNER
Benedict Coal Corp.

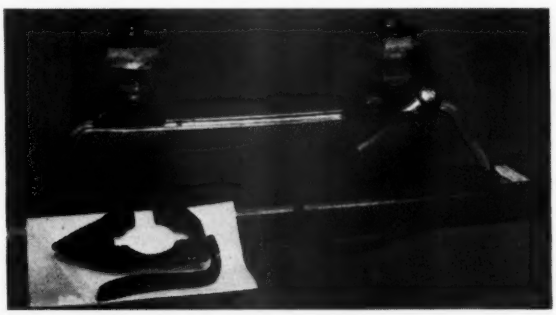
This switch has been in successful operation on the man and supply incline for several years. The incline is 3,500 ft. in length, with pitch ranging from 15 to 32 degrees; it has 12 different stations, and all stations are marked on the indicating dial on the hoist. The hoist is equipped with automatic breaking arrangements held in release position by a coil. When the limit is reached, the limit switch trips the oil switch which, in turn, automatically releases the coil holding the automatic breaking arrangement, applying the brake gradually through an oil dash cylinder.



Ball Nip Catcher

Submitted by SAVAGE ADKINS
Puritan Coal Corp.

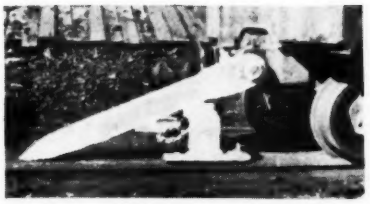
The purpose of the ball nip catcher is to provide a sure and positive means for "nipping" cables to the trolley wire. The photograph shows two trolley hangers; the one on the right has the nip catcher in place, while at the left the catcher is detached. As can be seen, this device consists of a thin piece of steel, cut to fit around the hanger, and can be attached or detached in a very few seconds without tools. It slips on over the wire and is then given a half turn, which fixes it securely against the hanger clamp. The ball of the nip slips easily into the slot of the catcher, and is as easily detached.



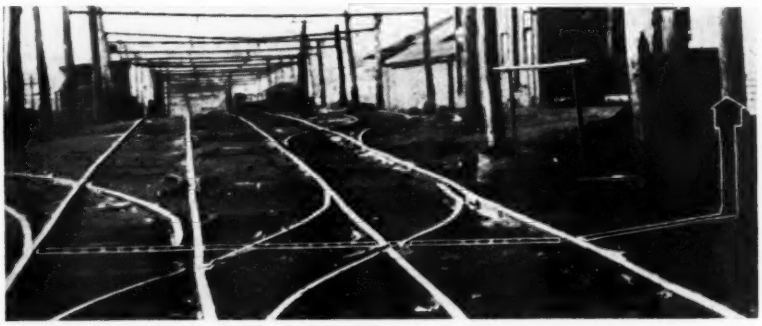
Car Stop Carrier for Rope Haulage

Submitted by PAUL E. RHEA
Rochester & Pittsburgh Coal Co.

This car stop carrier was designed to prevent the mine car drag stop from injuring the rollers on a rope haulway. As shown in Figure 1, the carrier consists of a flat steel bar which spans the track, having shoes



or sliders at each end, set to track gauge. It is connected by a chain to the mine car bumper. The shoes are dragged along on the rails as the trip moves forward and, in this position, the drag stop rests on top of the carrier, clearing the haulage rope rollers between the rails. In case the trip starts backward, the carrier remains stationary, allowing the point of the drag to drop to the ground (see Fig. 2), preventing further backward movement of the car.



Track-Switch Position Indicator

Submitted by J. G. POLLOCK
Heisley Coal Co.

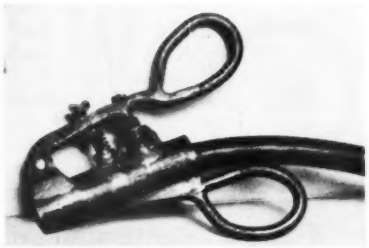
The switch position indicator was developed for use on rope haulage, and its purpose is to show the hoisting engineer whether or not the track switches are set in their proper position. The device consists of an electric contactor that is actuated by throwing the switch points, which in turn causes signal lights to flash at the hoisting engineer's station. The photograph is an installation at a surface switch. The turnout to the left is now in its proper position for loads coming to the tipple, and a green light is showing at the hoist operating control; if the switch should be inadvertently changed, the light would change to red.

Cutter Chain Safety Device

Submitted by JAMES BURKETT
Clearfield Bituminous Coal Corp.

This is a combined sheave bracket and lock for the cutter chain on open-center cutter bars. It is placed on the cutter bar, and locked in position by rotating the swinging latch 90 degrees. The lead rope is placed in the sheave groove while the machine unloads from the truck and pulls into sumping position. Without the use of the sheave the rope is usually thrown across the bit blocks, which results in rapid wear of the rope and bit blocks.

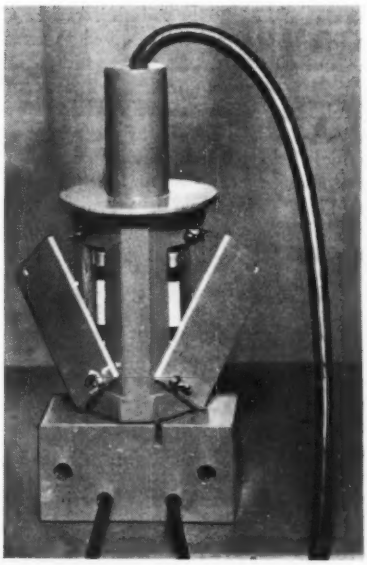
While the machine is tramming the bracket is latched in place, which automatically locks the cutter chain and prevents it from turning, thereby eliminating the possibility of accidents from that source.



Cable Cutter

Submitted by HOWARD POLAND
Pursglove Coal Mining Co.

This tool is designed to cut insulated cable when making splices, and may be used to make either a longitudinal or a transverse cut. It consists of a small hollow cylinder, into which small cutting points can be inserted, actuated by a hinged handle. The cable is placed in the tube; by squeezing the handles, a cutting point is forced into the insulation. Then, by turning the cutter or by pulling it lengthways, the insulation can be cut as desired.



Fused Drill Plug

Submitted by JOHN FUSHKO
Pursglove Coal Mining Co.

The receptacle for this plug is mounted on the cutting machine, thus providing a definite place for the connection of the electric drill. The plug is so designed that the drill may be connected only in the proper manner, and the shielded contact points eliminate arcs. This provides a safe and efficient means of connecting the drill in the mine.

WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

Washington Highlights

LABOR: Administration policy shows firmness and determination to deal with production stoppages.

TAX REVENUES: Ways and Means Committee shows country it will write its own bills.

SENATOR PAT HARRISON: Is his return to Washington an Administration move on the Tax Bill?

CONSUMERS COUNSEL: Showing pointed interest in new coal price hearings.

COPPER, ZINC, STEEL: All are now under priorities and preference ratings.

FOREIGN TRADE AGREEMENTS: Negotiation of an Argentine Trade Treaty may check tungsten production.

IRON ORE: 18,035,000 tons down the Lakes at end of May. Same time in 1940, shipments 7,643,000.

ST. LAWRENCE PROJECT: Hearings by Committee on Rivers and Harbors June 17.

MONETARY BILL: Senator McCarran guards domestic silver producers' price.

MINE MACHINERY REPLACEMENTS: OPM believes mining ranks closely with munitions.

COAL WAGE AGREEMENT: Mediation proposals agreed to; no stoppage of production.

THE President's action in declaring a state of full national emergency resulted almost immediately in a stiffening of attitude on the part of the Senate and the House of Representatives, as well as in the Administrative Departments and other Federal agencies. There is a growing atmosphere of grim determination to surmount the problems of legislation and the labyrinthian mazes of the involved national defense program. Strong in their authority under the declaration of emergency and the recently enacted Priorities law the officials of the OPM and related agencies are becoming more firm in their dealings with industrial managements. The Administration as a whole appears to be resolved to meet its problems with confidence and fortitude even to the laudable extent of lending its authority to the spanking of some of the misguided labor groups which have been taking advantage of the present state of national tension and in so doing have halted production of ships, aircraft and other defense necessities.

Tedious Tax Work Progresses

Most interesting recent development in the formulation of the Revenue Bill of 1941 was the rebuke administered to the Treasury Department by the Committee on Ways and Means, in voting 19 to 5 to discard the Treasury's recommendation to abandon the average earnings method of computing the Excess Profits Tax credit. The Committee acted in response to a flood of appeals from business enterprises of many types throughout the country. The elimination of the average earnings credit may be again raised by the Treasury before the Senate Finance Committee but the expression from the Ways and Means Committee is significant.

Subsequently this Committee has decided not to reduce the personal exemption on individual and married persons and it is understood that the normal rate will remain at 4 percent but that there will be heavy surtaxes. Although it has received but little recent publicity the proposal to levy a manufacturers excise tax, similar to that reported out by the Committee in 1932, is not dead.

From the beginning of the Revenue hearings on April 24 the Treasury had made no statement of its position on the Excess Profits Tax; and when finally on May 19 Assistant Secretary John A. Sullivan renewed the Treasury's original recommendations of the summer of 1940, the members of the Committee were not at all pleased. In response to the need for a reply to the Treasury's position, Chairman H. B. Fernald of the American Mining Congress's Tax Committee presented the position of the mining industry before the Committee on May 26, outlining a number of amendments needed to remove hardships and inequities in the present law. Chairman Fernald's statement is presented in full in this issue of the JOURNAL.

It is now apparent that there cannot be a draft of the Revenue Bill of 1941

ready for House floor action before early July.

Industrial Dispute Problems

Protests against work stoppages in the defense industries made by Senators and Representatives have continued to grow in volume and, with very few exceptions, there is general accord with the action taken by the Administration in the outlaw strike staged at the plant of the North American Aviation Corporation in southern California. There, with the complete approval of the national Union officials, the striking workmen were rehired, while order in the area was maintained by the presence of Federal troops. The National Defense Mediation Board has made progress, and a more orderly procedure in the handling of industrial disputes can be envisioned for the future.

In addition to the Vinson Bill, now on the House calendar, which would provide a compulsory 25-day waiting period before the calling of strikes, restrictions were placed in a War Department Appropriation Bill, and the chairmen of the Senate and House Committees on Military Affairs have introduced a Property Seizure Bill, giving the President powers which might be used to operate plants when labor disputes cause cessation of production. Senator Tom Connally of Texas has also introduced a bill which would amend the Selective Service Act, to permit the Government to operate plants during labor disturbances.

Tightening Wage-Hour Administration

Hacking a very substantial sum from the Wage-Hour Division appropriations, the House Appropriations Committee admonished in its report, "It is the judgment of the Committee that a substantially effective enforcement of the Fair Labor Standards Act can be had without the necessity of endeavoring to inspect each and every firm that is subject to the Act." And again "the sum (allowed) will be sufficient to investigate all complaints of violation that might be registered with the Division and will permit, in addition thereto, inspector services to be available for spot-checking industry throughout the United States. In the opinion of the Committee this is as far as Congress ever intended the Bureau to go in the matter of enforcement." The Appropriations Committee clinched its handling of the Wage and Hour Division affairs by placing the money for the legal personnel of the Division's field offices under the Solicitor's office of the Labor Department and, further, by recommending that one organization under one head is really sufficient for the enforcement of the Walsh-Healy Act, the child labor provisions of the Fair Labor Standards Act, and the wage and hour provisions of the Fair Labor Standards Act. The rebuke by the House Committee was most timely, as it was apparent that the Wage and Hour Division was preparing to place a very large number of inspectors in the field.

The Wage and Hour Division is also engaged in a revision of the regulations concerning records to be kept by employers. Preparation is being made to require that basic records be maintained which shall specifically show the total daily and weekly hours worked, total weekly straight-time earnings or wages, total weekly overtime excess compensation for each employe, and additions to or deductions from wages paid each work-week. Vigorous protests have been filed with the Division by the American Mining Congress and by many of its members, stating that the practice is almost universal in the industry to keep payroll records on a semi-monthly basis, and that the procedure outlined by the Division for dealing with low-wage industries is entirely unnecessary in the high-wage mining industry.

As of June 16, the Division released a revision of Interpretative Bulletin No. 6, which relates to retail and service establishments under the exemption provided by Section 13(a)(2) of the Act. In discussing company cafeterias or stores, the bulletin recognizes that the exemption applies in cases where, among other conditions, "the goods or services are sold for cash to the employe and the store is normally opened to the general consuming public." Concerning employes of cookhouses and bunkhouses in lumber and mining camps, the bulletin states, in part, "the cookhouses and bunkhouses are not adjuncts which are unrelated to the business of lumber or mining. They are as much a part of the principal business as the tool house. Failure to provide the facilities would make continued operation difficult. Further, the furnishing of such facilities is not carried on in the same manner as the operations of commonly-recognized retail or service establishments. In our opinion, therefore, cookhouses and bunkhouses may not be considered as a separate retail or service establishment for purposes of the exemption."

Acting on the protest of the International Union of Operating Engineers, the Exemptions Section of the Division on May 21 conducted a hearing at Butte, Montana, which opened up the seasonal exemption order of January 3, 1940, for the operation of placer gold properties in northern United States and Alaska. It was announced at the Butte hearing that briefs may be submitted to the Wage-Hour Division, Department of Labor, Washington, D. C., up to six weeks from the date of the hearing.

Another Trade Treaty

The Department of State on May 13 gave notice of intent to negotiate another foreign trade agreement with the Republic of Argentina. Listed among the commodities subject to reduction in duty through negotiation were tungsten ore and concentrates, which now carry a duty of 50 cents per pound on the tungsten content thereof. Filing date for briefs closed on June 12 and hearings will be conducted before the Committee for Reciprocity Information on June 23. The American Mining Congress and tungsten producers throughout the country are deeply concerned and have protested vigorously through numerous sources. Granting a 50 percent reduction in the duty on tungsten in the proposed treaty with Argentina will not bring in any more tungsten ore or concentrates at this time, but it will renew the grave apprehension felt by every producer of tungsten at the time of the negotiation of the foreign trade agreement with the United Kingdom in 1938. It is well known to the tungsten producers that our industries are well covered as to supplies for the balance of 1941 and for the first half of 1942, and it is further known that very large tungsten producing properties are coming in, in California and Idaho, with many lesser producers in other states.

Metal and Industry

With industry-wide mandatory control for copper and with all steel under a General Preference Delivery Order, the Office of Production Management is moving still further into the metals picture. Allocations for the emergency zinc pool were raised for this month to 22 percent of April production.

On the other side of the picture an encouraging report of stockpiles was released, showing: Chromite—stockpile sufficient to supply industry for more than a year; copper—consider-

(*Continued on page 52*)

PERSONALS

C. E. Miller is head of the committee working to increase the membership of the Arizona Small Mine Operators Association.

Robert P. Patterson, Under-Secretary of War, made the principal address at the graduation exercises of the Montana School of Mines on June 4. His subject was "Montana, Neighbor to the World."

Petrus W. Meyeringh has been made a vice president of the Hercules Powder Company and a member of the company's executive committee. **Albert E. Forster,** general manager of naval stores department, and **Luke H. Sperry,** chief engineer of the company, were elected directors at the same time.

Guy E. Hoover has taken the position as assistant to engineer of coal properties of the Chesapeake & Ohio Railway Company, at Huntington, W. Va. He was formerly with the Gauley Mountain Coal Company.

Lawson W. Carder, a wireman in the employ of the Mountain Fuel Company, was awarded a flame safety lamp for making the best record in the Mining Extension Classes of West Virginia University, during the 1940-41 school term.

Dr. Wilbur A. Nelson, professor of economic geology and head of the department of geology at the University of Virginia has been appointed as a staff expert to the Ferrous Alloys and Minerals Branch of the Priorities Division in Washington. Dr. Nelson was at one time with the Tennessee Geological Survey and has been state geologist for both Tennessee and Virginia.

John Harris Ward, assistant to the financial vice president of the Commonwealth Edison Company, Chicago, Ill., has been made assistant chief of inventory control in the Minerals and Metals Section of the Priorities Division in Washington.

L. M. Kniffin, New Mexico mining operator and engineer, is now located in Mexico City, where he is in charge of shipments of Mexican tin to the new smelter being built at Texas City, Texas, by the Tin Processing Corporation, New York.

Donald A. Callahan, of Wallace, Idaho, was elected president of the Lexington Mining Company at a meeting of the Board of Directors on May 22. The company has in the past few years reopened the old Montana Silver Queen mine at Neihart, Montana, and is making regular shipments of silver-gold-copper concentrates to the East Helena smelter. Other officers elected were **Judge W. F. McNaughton,** of Coeur d'Alene, Idaho, as vice president; **Carl J. Batter,** of Washington, D. C., secretary-treasurer, and **H. R. Evans,** superintendent.

Mr. Callahan who is a vice president and director of the American Mining Congress was in Washington on June 2, at which time he was admitted to practice before the Supreme Court of the United States.

A. M. Gaudin Richards, professor of Mineral Dressing at Massachusetts Institute of Technology, received the honorary degree of Doctor of Science, in recognition of achievements in his chosen field, from the Montana School of Mines at the annual commencement on June 4.

Professor Gaudin was research professor of mineral dressing at the Montana School of Mines from 1929 to 1939.

J. J. Goss of the firm of Joseph L. Goss & Son, manufacturers' agents, Pittsburgh, Pa., won the gold Gruen wrist watch for high score in the contest conducted at the Mining Congress Journal booth during the recent Annual Coal Convention and Exposition at Cincinnati.

J. B. Haffner, manager of the Bunker Hill & Sullivan Mining & Concentrating Co., was the principal speaker at the fifth annual banquet and meeting of the Geological Engineering Society of the Coeur d'Alene district, Idaho, recently.

Wilfred Sykes was elected president of the Inland Steel Company, succeeding Philip D. Block, at the last Board of Directors meeting. Mr. Block becomes chairman of the Executive Committee.

George W. Roddewig, general manager of the Hochschild properties in Bolivia addressed a luncheon meeting of the Mining Association of the Southwest in Los Angeles on May 6. His subject was "Tin Mining in Bolivia."

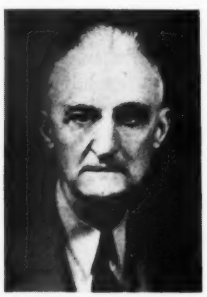
Alan C. Dodson, of Bethlehem, Pa., has been elected vice president of the Anthracite Operators Association, to succeed **Byron W. Sleppy,** of Wilkes-Barre, resigned.

Frank S. Hudson has accepted a position as efficiency engineer for Yuba Consolidated Gold Fields, San Francisco, builder and operator of gold dredges. His last position was as chief geologist with the Shell Oil Company, and he was also recently president of the Pacific Coast section of the American Association of Petroleum Geologists.

J. L. Bruce, general manager of mines on the Island of Cyprus for the Seeley W. Mudd Interests, recently disclosed in Los Angeles that the Cyprus mines operations have been seriously interfered with by developments in the Mediterranean. The number of employes had been reduced in several months from 6,000 to 1,600 workers.

Charles V. Averill, district mining engineer of the California State Division of Mines at Redding, has been promoted to the position of district engineer, with headquarters at Sacramento. **John Charles O'Brien,** of San Francisco, has been appointed to the position formerly held by Mr. Averill at Redding.

Francis M. Shore, an authority on the economics of the coal industry, has been made chief economist of the Coal Economics Division of the Bureau of Mines. He had been assistant to the chief of the Economics and Statistics Branch of the Bureau.



Thomas B. Laird, Jr., has taken a position with the U. S. Smelting, Refining & Mining Company, Salt Lake City, Utah. He was formerly on the engineering staff of the Gold Field Consolidated Mining Co.

C. R. Larrabee, special assistant to the director of the Bituminous Coal Division, Washington, has been designated acting chief of the Trial Examiners Section of the Division replacing **Thurlow G. Lewis,** of Benton, Illinois, who resigned the middle of May to return to private practice as an attorney at Benton.

E. A. Frick has accepted the position as chief engineer of the Glacier Silver-Lead Mining Company at Libby, Montana. He was formerly employed as mining engineer by the Pend Oreille Mines & Metals Company at Metaline Falls, Washington.

L. W. Whicher, New York City, for many years treasurer of the Copper Canyon Mining Company, Battle Mountain, Nevada, has been elected president of the company. **Arthur Notman,** New York City, was elected vice president, and both men, with **Robert H. Raring,** general manager of mines, were elected directors.

J. J. Lillie, manager of the Mountain City Copper Company, Mountain City, Nevada, has assumed charge of the Copper Canyon Mining Company properties, south of Battle Mountain. The Copper Canyon properties have been optioned by the International Smelting & Refining Company, of which Mountain City Copper is a subsidiary.

Whitney P. Mee, for many years with the smelting department of the American Smelting & Refining Company in Mexico, is now with the RFC in Washington serving in connection with the tin smelter being constructed at Texas City, Texas.

Ralph S. Blitz has been appointed manager for the Vanadium Corporation of America, at their properties at Naturita, Colorado.

Edwin J. Appel has been appointed manager of the new aluminum reduction plant which the Reynolds Metal Company is building at Longview, Washington.

Fred W. Bailey, mining engineer for many years in Mexico, has been appointed superintendent of the Pollinger mine, Montana, by the McAlester Fuel Company. The mine is a gold-silver property, located in the Silverstar district, Madison County, Montana.

J. E. Boothe of the Boothe Coal Company, Mosby, Missouri, won a rubber raincoat as the prize in a contest conducted by the U. S. Rubber Company at their booth at the Annual Coal Convention and Exposition at Cincinnati.

J. B. Morrow, president of the Pittsburgh Coal Company, Pittsburgh, Pa., was married the latter part of April to Margaret Helen Baer, of Youngstown, Ohio.

W. W. J. Croze, Duluth, Minn., was presented with the honorary degree of Doctor of Engineering by the Michigan College of Mining and Technology on June 6. He recently retired after a busy life on exploration work in various parts of the world. He was formerly engaged in geological work with companies on the iron range.

William H. Plummer, Coleraine, Minn., who has been superintendent since 1911 in the Canisteo district for the Oliver Iron Mining Company, has been made general superintendent in the district for the company, succeeding **Alexander King,** who died recently.

Ernest B. Agee, formerly superintendant of the Youngstown Mines Corporation at Dehue, W. Va., was recently promoted to operating head of the coal mines of the Youngstown Sheet and Tube Company. These, in addition to the Dehue property, include the mines of the Buckeye Coal Company in Pennsylvania. Mr. Agee will make his headquarters at Nemacolin, Pa.

Recent visitors at the office of the American Mining Congress were **Robert M. Hardy** of Yakima, Wash., president, Sunshine Mining Company, Wallace, Idaho; and **William Loach, Sr.,** vice president, Wolf Tongue Mining Company, Boulder, Colo., and director of the Firth Sterling Steel Company. Mr. Loach has been in Washington for several days in the interest of Western tungsten producers.

The Koppers Coal Company has announced changes in its personnel, to become effective July 1, 1941, as follows:

Herbert N. Anderson, now assistant to the president of the New England Coal & Coke Company, will become assistant general manager of sales, his principal activity to be the direction of railroad fuel sales. His headquarters will be in Pittsburgh but he will also maintain an office in New York City.

Harold J. Spear, assistant general manager of sales, now in charge of domestic sales, will assume direction of the commercial sales of Federal coal and of Koppers Pennsylvania coals. His headquarters will be in Pittsburgh but he will also maintain an office in New York City.

Henry D. Kidder, now with the New England Coal & Coke Company, will move his headquarters to Pittsburgh where he will take charge of the distribution and shipments of Koppers Pennsylvania and Northern West Virginia coals.

L. J. Lowell, now district manager in Detroit, will become assistant general manager of sales with headquarters in Pittsburgh, and will direct the sale of domestic coal.

Richard A. Ewald, now district manager in Cleveland, will become district manager in Detroit.

H. W. Crawford, now in charge of Lake sales in Chicago and Milwaukee, will become district manager in Cleveland.

John S. Owens, sales representative in Chicago, will handle sales in Wisconsin, working under direction of **F. A. Elmore,** district manager in Chicago.

Samuel S. Bruce, Jr., has been appointed sales representative by the Duff-Norton Manufacturing Co., with headquarters at Pittsburgh.

J. M. Howell has been named manager of the Schenectady works of the General Electric Company, succeeding **E. D. Spicer.** Mr. Howell was formerly assistant to Mr. Spicer.

James P. Gillies has been engaged by the Chicago Pneumatic Tool Company, New York, to assist in general sales activities.

T. E. McAndrews has been elected vice president in charge of traffic of the Virginian Railway Company, with headquarters at Norfolk, succeeding **S. M. Adsit,** resigned.

— *Obituaries* —

Guy W. Johnson, manager in the Tri-State district of the American Zinc, Lead & Smelting Company, died at his home in Joplin, Mo., on May 30 of a heart attack. He was 51 years old. Mr. Johnson had been in the employ of the company for many years. He had taken an active part in social and mining affairs of the district; he was a director of the Tri-State Zinc & Lead Ore Producers Association and was active in several other mining organizations in the field. Surviving are his widow and two sons, Robert and Edward Johnson.

W. H. Gates, superintendent of the Buckeye Coal Company mine at Nemacolin, Pennsylvania, died on May 4 at the age of 68. He had been superintendent of the Buckeye mine since 1917.

Alexander King, Coleraine, Minn., general superintendent in the Canisteo district for the Oliver Iron Mining Company, died in late April at the age of 57. He had been in declining health for several months.

Dr. John Henry Bannister, prominent West Virginia coal operator died on June 2 in a Charleston hospital at the age of 51. He had been prominent in the coal industry in West Virginia for many years. At the time of his death, he was president and general manager of the Little War Creek Coal Company at Litwar, McDowell County, and secretary-treasurer and general manager of the Eli Smokeless Coal Company at Nuttallburg, Fayette County.

Clarence O. Morris, a member of the West Virginia Department of Mines, died in late April. He was 48 years old. He had been connected with the first-aid and mine rescue work of the department for many years.

NEWS and VIEWS

Hearing On Minimum Prices

In April, Secretary of the Interior Harold L. Ickes announced that the Bituminous Coal Division of the Department of the Interior would soon call a hearing to determine changes in costs of producing coal, as a basis for making necessary adjustment in minimum prices. This action, he said, was prompted by the fact that preliminary statistics published recently by the Department of the Interior had indicated that the cost of producing coal had dropped an average of 18 cents per ton since the cost-base for minimum prices was set up. The Secretary pointed out that the Coal Act requires that minimum prices be adjusted accordingly, whenever it is ascertained that there has been a change in excess of two cents per ton in the "weighted average cost" of producing coal in the various minimum price areas. The preliminary statistics, indicating the 18-cent decrease, covered the cost of operations during 1940 for mines producing more than 90 percent of the nation's coal, according to the Secretary.

The hearing was held in Washington beginning May 21, before Division Trial Examiner Floyd McGown. On May 27 the hearing was adjourned until June 10, at which time data for the different marketing areas would be presented. Prior to the opening of the hearing, Bituminous Coal Division Director Howard A. Gray stated that the length of the hearing would depend entirely upon the manner in which interested persons handled the presentation of their case, and that the Division was seeking every appropriate means of expediting the proceedings. Since the formulation of the previous minimum price cost-base, expiration of wage contracts on March 31, 1941, has resulted in negotiations between mine owners and mine workers, which will result in higher labor costs. The order setting the hearing provided that all interested parties would be given a full opportunity to be heard, to examine and cross-examine witnesses, to present evidence relating to the correctness or incorrectness of the Division's preliminary cost figures and to present their own evidence relating to the extent of changes in costs in excess of two cents per ton. Interested persons will be given full opportunity to participate in a similar manner in the price-adjustment phase of the hearing.

The present minimum prices, which became effective October 1, 1940, were based on 1936-1937 costs, as "adjusted" to account for changes since the basic data were collected.

Lake Superior Safety Conference

The Eighteenth Lake Superior Mine Safety Conference, sponsored by the Lake Superior Mining Section of the National Safety Council, will be held in Duluth, Minn., June 26 and 27. The program will include papers on the following subjects: "Hazards of Pressure Vessels"; "Methods of Bringing Safety to the New Man in Iron Mining Industry"; "Safety at Beneficiation Plants"; "General Open Pit Hazards"; "Drilling and Blasting in Iron Mines"; "General Open Pit Haulage Hazards"; "Safety Accomplishments During the Past 30 Years"; "Review of Accidents of 1940"; "Safety in Shop Practices"; and "Fires in Lake Superior Iron Mines."

A luncheon will be held at noon on June 26, and a banquet in the evening, the toastmaster for which will be Dennis F. Donovan. Address at the banquet will be given by Dr. Ralph L. Lee, Department of Public Relations, General Motors Corp.

Ruling Holds Captive Mines Subject To Guffey Act

The United States Circuit Court of Appeals at Philadelphia recently ruled that captive coal mines are subject to the provisions of the Guffey Act. The ruling was in answer to an appeal by the Keystone Mining Company for exemption from the law partly on the grounds that the company is wholly owned and controlled by the Delaware, Lackawanna & Western Railroad and is really a part of the organization of the latter.

Federal courts of equal rank, in other cases of like character, have held in previous decisions that the Guffey Act did not apply to captive coal mines.

West Virginia Institute to Meet in June

The annual summer meeting of the West Virginia Coal Mining Institute will be held in Huntington June 20. It is expected that about 150 members, guests and their wives will be in attendance for this meeting of the Institute, which is in its 34th year.

Papers will be delivered on the pertinent subjects of mine modernization, safety, and selling of coal, with both the views of the operating men and the coal distributors. The papers on coal distribution will give operators and distributors an opportunity to air and discuss some of their common problems.

The principal speaker at the banquet will be Dr. Charles E. Lawall, President of West Virginia University, with Colonel Walter G. Crichton, President of the Institute, as toastmaster. Entertainment will be sponsored for the members and ladies attending by a local committee, which will include golf and inspection trips on Saturday the 21st.

Drilling Discloses Merger Mines Ore Body

This spring, drilling on the property of the Merger Mines Corporation in the Coeur d'Alenes district, Idaho, disclosed an ore body on the 2,000-ft. level. Where penetrated by the drill the ore body was 3 ft. 8 in. wide at a point 185 ft. from the tunnel, with a core that assayed 19.4 ounces of silver to the ton and with lead and copper that made the total value $19.37 per ton, according to the president of the company.

A second drill hole is now being directed at the ore body at a point 600 ft. lower than the first. On completion of the drilling campaign, a cross-cut will be driven to the ore.

Copper Under Priorities Control

The Office of Production Management in Washington on May 31 placed copper under a system of mandatory, industry-wide control. E. R. Stettinius, Jr., defense director of priorities, said the action was made necessary by "a shortage of copper which is expected to become worse during 1941." Priority, or preference, ratings will be issued for copper needed in defense industries. The remainder of the available supply will be allocated for civilian purposes by the priorities division in accordance with recommendations of the office of Leon Henderson, price administrator. At the time of this writing it is not yet clear where or how closely the line of division will be drawn between the supply for defense purposes and that for civilian purposes.

Federal Government Needs Engineers and Technologists

At various times this spring the United States Civil Service Commission has issued calls for engineers, metallurgists and technologists for employment in national defense positions and for which examinations are open. In addition to the needs previ-

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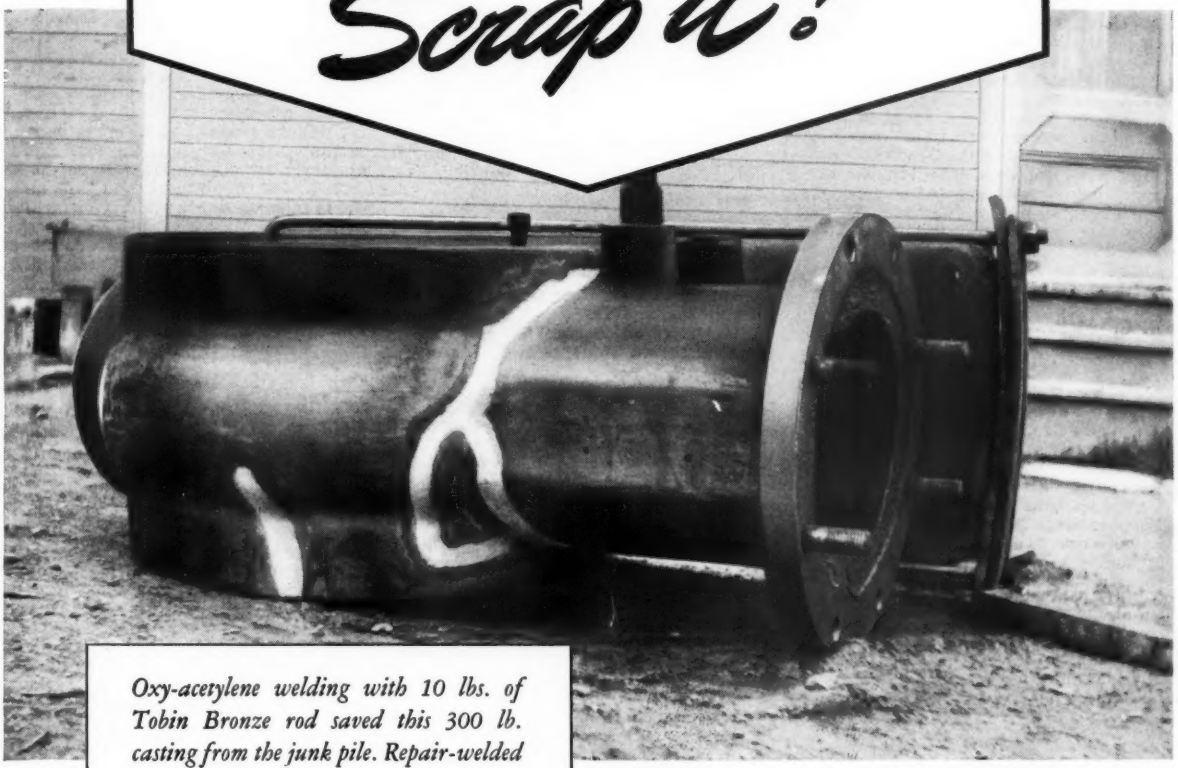

Oxy-acetylene welding with 10 lbs. of Tobin Bronze rod saved this 300 lb. casting from the junk pile. Repair-welded by Gemme Garage, St. Damase, Quebec.

But it was repair-welded with Tobin Bronze. Still going strong in December 1940!

When cracks appeared in the base of this crude-oil engine block, attempts to prevent their extension by clamps proved futile. In a short time they had practically encircled the cylinder —only fifteen inches of solid metal remaining between the ends of the cracks.

Replacement meant heavy cost and important time lost waiting for the new casting. It was then that Tobin Bronze welding was suggested. And just ten hours later, the engine base was ready to go back into service.

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ously announced, the Commission has recently issued a call for coal inspectors (salary $3,800 per year) to assist and advise the post quartermaster regarding fuel requirements; to contact shippers on the quantity, quality, or condition of coal deliveries, and inspect coal at points of delivery.

Ten years' experience is required in dealing, commercially, in coal in bulk greater than carload lots, such as that involving inspection of coal in boats, barges, or railroad cars for any use of the following purposes: Storage and consumption on ships; railroad use; use in steel mills, coke plants, or industrial plants; or at a terminal where coal is unloaded in bulk for re-shipment. Qualified persons who are available for Government employment in these positions are urged to obtain further information at once from the Secretary, Board of U. S. Civil Service Examiners, at any first- or second-class post office, or write to the U. S. Civil Service Commission at Washington, D. C.

New Iron Mine at Ishpeming

Construction work has been started on a new iron ore mine northeast of Ishpeming, Mich., a property owned jointly by the Cleveland-Cliffs Iron Company and the Bethlehem Steel Corporation. The Austin Company have contracts for the design and construction of the buildings necessary for the mine operation, and an expenditure of $250,000 is planned on modern facilities for workers and for the needs of the mine. It is expected that the operation will eventually have a capacity of 1,600,000 tons annually.

Tri-State Mines Unwatered

Companies operating mines about Oronogo, Mo., have faced a stupendous task in unwatering the shafts which were flooded recently when local streams overflowed their banks and drowned the workings. The Eagle-Picher Mining and Smelting Company at their No. 15 pump station north of Center Creek have resumed pumping operations to dewater the lower levels of the Oronogo mine. At the time, about 20 ft. of water was standing in the lower workings and the water after the pumps were installed was lowered at the rate of several inches per day.

Two pumps, a 16-in. Pomona turbine and a 14-in. similar pump are handling 10,000 to 11,000 gallons of water per minute, after large electric motors had been installed on them. Other pumping installations are also progressing.

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Manganese Processing Plant In South Dakota

Bids have been called for by the United States Bureau of Mines for the construction of a manganese processing unit to be built near Chamberlain, S. Dak. A fund of $125,000 has been allocated by the Bureau for the purpose, and construction is expected to begin this spring or early summer.

The manganese deposits near Chamberlain are known to be large, but the ore is low-grade and heretofore it has been impossible to process it on a commercial basis. When the strategic minerals investigation was started in the Chamberlain field, it was hoped that a simple screening system could be employed in concentrating the nodular ore, but Bureau officials have since reported that the material is not susceptible to screening without preliminary treatment. The processing plant now to be built is designed to eliminate the difficulty.

Proceedings Started to Revoke Coal Distributor Registrations

A recent announcement of the Bituminous Coal Division of the Department of the Interior stated that a proceeding has been inaugurated, designed to revoke the registration, as distributors, of individuals or companies who may be found not eligible to purchase coal at a discount from minimum prices.

A hearing is to be opened on June 26, before a trial examiner at Washington, D. C., the announcement continued, to determine whether approximately 500 of the individuals and companies registered by distributors are qualified to continue as eligible to purchase coal at a discount from the minimum prices. The parties named in the proceeding have been directed to show cause why their registrations should not be revoked.

Code member producers may allow discounts from the minimum prices at the mine in selling coal only to registered distributors and registered farmers' cooperative organizations. Only bona fide wholesale coal merchants who are actively, regularly and continuously engaged in the business of buying and reselling coal in not less than ship cargo or railroad carload lots, without physically handling such coal, may be registered as distributors. Discounts are not allowable on retail coal transactions, or on sales to consumers. The Division has granted nearly 2,000 applications for registration as distributors.

The order also provides that each registered distributor shall file an answer to the "show cause" order on or before June 20 at the Division's Washington office. Such answers shall contain the names and addresses of any code members (producers), sales agents, registered distributors, or other persons from whom the registered distributor may have purchased coal. The answers also must show the tonnage of each kind, quality and size of coal purchased from each, the amount paid therefor, the names and addresses of persons to whom any such coal was resold, the tonnage of each kind, quality and size of coal resold to each, the price per ton charged or received therefor, and the dates of such purchases and resales. The answer also must set forth the reasons, if any, why registration should not be revoked.

The order provides that failure to file such an answer within the time limit will be deemed to be an admission that the person is not a bona fide coal merchant eligible to receive discounts under regulations, and that an order revoking the registration will be entered.

At the hearing, each registered distributor who has filed an answer will be afforded opportunity to be heard and offer evidence in support of it.

Illinois Mining Institute Enjoys Boat Trip

Leaving the pier at St. Louis on the evening of June 6, the steamer *Golden Eagle* carried members and guests of the Illinois Mining Institute on the 23rd Annual Boat Trip of the Institute. The steamer returned to St. Louis on Sunday morning, June 8. On June 7 a business session was held on board. An address of welcome was given by the president, M. M. Leighton, after which several papers on operating and economic problems were presented. The trip was thoroughly enjoyed by all those who had the privilege of going.

Short Course in Coal Utilization

The Sixth Short Course in Coal Utilization, sponsored by a number of cooperative organizations in Illinois and Indiana, met at the University of Illinois on May 21-23, inclusive. Papers were presented on various phases of coal preparation, marketing, combustion and utilization. A feature at one session was an "Information Please" Sales Clinic, a panel for the discussion of problems of marketing coal and coal-burning equipment. The purpose of the Short Course is to present an educational program of technical and practical information pertaining to coal and its efficient utilization for the benefit of those engaged in mining, preparing, marketing and using coal, as well as those manufacturing and distributing machinery for the preparation and utilization of coal.

South American Aluminum Ore Purchase

To provide additional ore for the aluminum refining plant which the Reynolds Metals Company recently completed at Lister, Ala. (near Muscle

Shoals), R. S. Reynolds, president of the company, has signed contracts for the delivery, beginning next year, of 6,000,000 tons of high-grade bauxite from properties located in Surinam, Dutch Guiana. The deposits are owned by N. V. Billiton Maatschappij, a Dutch company, and the contracts were signed on behalf of that company by J. van den Broek, managing director. The company will install modern mining machinery in the South American fields and will ship 2,500 miles by water to Mobile, Ala. These deposits are the source of high-grade foreign bauxite closest to the U. S.

Mine Inspectors Meet

The Mine Inspectors Institute of America held their Thirty-second Annual Convention at Bluefield, W. Va., on June 2-4, inclusive. Two days were devoted to Institute business, to papers relating to safety and inspection, and to discussions of inspection measures and safety problems. A symposium was held on "Recent Coal Mine Explosions," with discussions on the lessons to be learned from these explosions and the major preventive measures to be taken to prevent a recurrence. On June 3 members and guests had a pleasant automobile trip to points of interest, including Claytor Dam, the hydroelectric plant of the Appalachian Electric Power Company, and the new plant of the Hercules Powder Company. Virginia Polytechnic Institute of Blacksburg, Va., also was visited. On Wednesday evening, June 4, the annual banquet was held.

James McSherry of Springfield, Ill., is president of the Institute, and Clyde A. McDowell is secretary.

New Plant to Use Bonneville Power

The Electro-Metallurgical Company, a subsidiary of the Union Carbide and Carbon Corporation, will complete early next year the construction of an electric furnace works in the St. Johns district, Portland, Oreg., and will begin the production of ferro-alloys and alloying metals, for use in the steel and non-ferrous industries and military transport industries, vital to national defense. Calcium carbide, the raw material from which acetylene, acetone, and other defense necessities are made, will also be produced.

In May, the company signed a contract with the Bonneville Power Administration for the purchase of 13,000 kilowatts of Columbia River power, delivery to begin in February, 1942.

Alaska Nickel Deposits Examined

During the field season of 1940, according to a recent release, the Geological Survey, United States Department of the Interior, through the work of its geologists J. C. Reed and J. Van N. Dorr, made examinations of the nickel deposits of Bohemia Basin and vicinity, Yakobi Island, Alaska. The principal findings resulting from that work are summarized as follows:

The nickel deposits of Bohemia Basin and vicinity are on Yakobi Island, in southeastern Alaska about 130 miles by water west of Juneau. Their existence has been known for many years, but prior to 1940 they had not been examined systematically and in detail with a view to determining their geologic environment and the amount and grade of the material that might be available in them.

The nickel deposits of Yakobi Island are sulfide-bearing bodies that are found only in the more calcic of the younger intrusive rocks, principally in the norite. They are believed to be segregations of material that crystallized early out of the magma from which all the younger intrusive rocks eventually consolidated. The sulfide minerals present include pyrrhotite, pentlandite, and chancopyrite.

Some of the sulfide-bearing bodies are as much as several hundred feet in length. Eight of these bodies have been partly prospected, and at least four others are known to exist but have not been prospected. There probably are other bodies that do not crop out at the surface and hence are as yet undiscovered. Still other sulfide-bearing bodies may well be present in noritic parts of the stock in unmapped areas on Yakobi Island and in similarly calcic parts of other stocks along the west coast of Chichagof Island.

Calculations based on the investigations made by the Geological Survey in 1940 indicate that about 6,000,000 tons of rock, containing about 0.36 percent of nickel and 0.27 percent of copper, is present and available for mining in the eight bodies that have been partly prospected. The estimate of the number of tons is based on the very conservative assumption that each of the bodies extends to a depth equal to half its length.

Further prospecting will probably greatly increase the estimate of the tonnage available in the bodies, but it probably will not greatly change the estimate of the grade. Rough calculations indicate that the material can be mined and the nickel and copper extracted from it at a cost roughly equal to the value of the metals that would be produced.

By-Product Ovens To Be Built At Chester

The Philadelphia Electric Company has contracted with the Engineering and Construction Division of The Koppers Company to build a battery of 21 coke ovens at its by-product coke plant at Chester, Pa. The ovens will be of the Koppers-Becker underjet type and will have a total coal carbonizing capacity of 142,000 tons per year. The ovens are to be completed in April, 1942.

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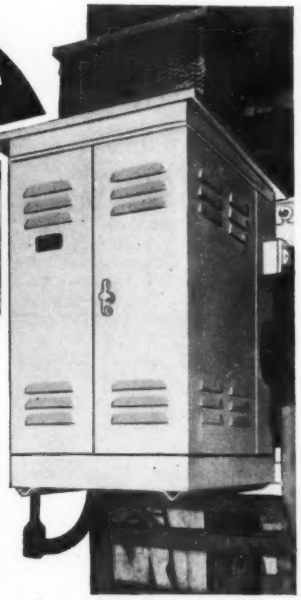

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Estimates of Average Coal Prices Revised

The Bituminous Coal Division of the Department of the Interior recently issued revised preliminary estimates of average prices at the mine which producers received from the sale of coal during the nine months of 1940 which ended on October 1, the date minimum prices became effective.

The announcement stated that there was little change in the previously estimated average price for the nation as a whole, which indicated that producers sold their coal during the nine-month period at prices averaging approximately five cents per ton below the 1940 cost of production for all mines.

However, the new figures showed that producers in some districts realized an average price substantially less than that first estimated, while producers in other districts received a larger average price. As the new estimates still are preliminary they are subject to some further revisions, but it is believed that such revisions will not reflect radical changes over the present figures.

The new estimated average price for the nation as a whole is $1.8464 per ton, which is $.0077 per ton less than the previous estimate, and indicates that producers sold their coal at an average price $.0538 per ton less than the average cost of $1.9002 per ton for all mines during the year of 1940.

The greatest changes in the average prices realized by the producers in the various individual districts during the 1940 period were in No. 10, Illinois; 12, Iowa; and 15, Missouri-Kansas-Oklahoma field. The new figures indicate that Illinois mines realized an average price of $1.6695 per ton, which is $.1449 per ton less than the previous estimate. Iowa mines realized an average price of $2.4374 per ton, which is $.0984 per ton less than the previous estimate. Producers in the Missouri-Kansas-Oklahoma field realized an average price of $1.9794 per ton, which is $.2208 per ton more than the previous estimate.

New Jersey Iron Mine Changes Hands

The E. G. Brooke Iron Co. of Birdsboro, Pa., has contracted to buy the Richard Iron Ore mine, situated about two miles north of Dover, N. J., from the Thomas Iron Co., a subsidiary of the Philadelphia & Reading Coal & Iron Co. The purchase includes about 500 acres of land and all the equipment, consisting of power plant, head frame and hoisting machinery, crushing and concentrating plant, office and dwellings. A New Jersey corporation, called the Richard Ore Co., wholly owned by the E. & G. Brooke Iron Co., has been formed to take over and operate the mine, which is producing a high grade of magnetic concentrates, for blast furnace use, and lump ore for open hearth furnaces.

World's Largest Placer Operation

Reports of the Bulolo Gold Dredging, Ltd. Company show it to be the world's largest dredging operation. The property is located in a very inaccessible part of New Guinea. In the last fiscal year 185,000 ounces of gold was recovered. The net profit last year was $4,483,775 (Canadian), equal to $4.48 per share outstanding. Three dollars per share was distributed in dividends during the year. It handled 18,353,000 cubic yards, and at the end of the fiscal year it had estimated gravel reserves of 164,000,000 cubic yards, and additionally about 20,000,000 cubic yards which is planned to be handled by hydraulic methods.

Being in an extremely remote area, the company pioneered in the use of planes for the transportation of freight. To the time of the report, a total of 36,782 tons of supplies and equipment had been flown in since the commencement of operations. Company officials stated that in the last three years the average cost of air transportation had been $35 a ton.

Anthracite Research Bill

The Senate Committee on Mines and Mining, of which Senator Guffey, of Pennsylvania, is chairman, recently held a hearing in Washington on a bill to appropriate $350,000 for a laboratory to be located in the hard coal fields to engage in anthracite research. Many representatives of the anthracite industry appeared in support of the measure.

Construction To Start On Mill For Brown Bear Property

The old Brown Bear gold mine, said to have produced between $15,000,000 and $17,000,000, was acquired last year by the Brown Bear Mining Company. The mine is in the Deadwood district near French Gulch, Calif.

Construction will start soon on a concentration plant with a daily capacity of 250 tons, to serve the mine. The present mill is treating 75 tons daily. In addition to mine production, it is expected that approximately 1,000,000 tons of old dumps can be profitably treated in the new mill.

Wheels of Government

(*Continued from page 45*)

able supply coming in from Chile; graphite—supply adequate for a year; manganese—supply for 16 months on hand; mercury—stockpile sufficient for six months, with steady domestic production; mica—more than a year's supply on hand; nickel—current supply low, but defense requirements assured since supplies come from Canada; quartz crystals—supply sufficient for present; tin—supply for more than a year; tungsten—domestic production being stepped up and substitutes being considered; zinc—shortage being met by priority control.

As an evidence of the manner in which the mining industry is meeting the demands of the present emergency, reports show the total Lake iron ore movement for this season at 18,035,000 long tons at the end of May, as compared to 7,643,000 long tons during the corresponding period in 1940. In the month of May alone, 11,081,199 tons were carried by the Lake cargo fleet.

St. Lawrence Seaway Project Active

The Administration's pet project, the St. Lawrence Seaway and Power Bill, is being pressed for Congressional passage. Hearings will begin before the Committee on Rivers and Harbors, June 17, and are expected to continue for several weeks. Opponents will make a determined and continuous resistance to this measure. The anthracite, bituminous coal, iron ore and steel industries in and tributary to the Great Lakes basin are positive in their knowledge of the harm which would follow Congressional approval of the present project.

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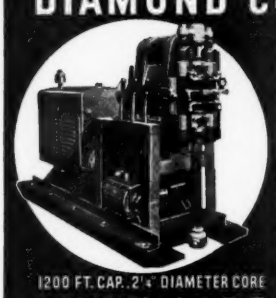
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Black Hills Largest Gold Producer

The Black Hills area of South Dakota, noted as a mecca for tourists, is the largest gold-producing area in the United States, according to a report just issued by the Bureau of Mines, Secretary of the Interior Harold L. Ickes was advised by Director R. R. Sayers.

The Black Hills have yielded more than $450,000,000 of gold since 1874 when the precious metal was first discovered there, and of this amount, well over 80 percent has come from the Homestake properties, largest producer in the United States.

The Bureau of Mines report, entitled "Reconnaissance of Gold-Mining Districts in the Black Hills, S. Dak.," gives the history of the district from the time of the discovery of the yellow metal in the area by two men who were attached to the military expedition of General George A. Custer who was making a reconnaissance of the region.

The discovery of placer gold eventually led to the discovery of lode gold. The first lode claims were the Giant and Old Abe, located by J. B. Pearson on December 11, 1875, and now a part of the Homestake property.

The original Homestake claim was located by Moses Manuel and Hank Harney on April 9, 1876; in the fall of 1877 it was purchased for $70,000 by George Hearst for the Homestake Mining Co. An adjoining claim, the Golden Star, was purchased at the same time. These two fractional claims contained about 14 acres. Since that time the history of lode gold mining has been largely the history of the Homestake mine, now the largest gold producer in the United States. Other mines and districts have had an interesting history and considerable production, but they have been overshadowed by the Homestake.

The Bureau's report describes in considerable detail lode gold mining in the Black Hills. It gives the location and ownership of the various properties, descriptions, types of ore deposits, conditions, production statistics, data on past and present activity, and other information of an economic nature likely to be of interest to those interested in the development of gold in the Black Hills. The report, published as Bulletin 427, Bureau of Mines, is for sale by the Superintendent of Documents, Washington, D. C. The price is 20 cents.

Correspondence

Further hearings are anticipated in the House of Representatives on the Dickstein Bill (H. R. 2791) when it is presented in a rewritten form. This bill provides for the colonization of Alaska by admitting aliens to the territory to the limit of unfilled immigration quotas.

An alternative and sound scheme to colonize and develop Alaska has been suggested by a prominent Alaskan in a recent letter. Quoting in part:

Mr. H. L. Faulkner,
Faulkner & Banfield, Attorneys,
Juneau, Alaska.

Dear Mr. Faulkner:

"I have an idea on that question which may be of some value:

"America should borrow a page from the Germans and attempt to do some long-range planning for the future. When our war efforts and preparations are brought to a final conclusion, we then must face the problem of wide-scale unemployment of our own people, and, of course, a staggering national debt.

"If we have several thousand aliens in Alaska this will only complicate the problems which we will have to face here. When the time comes, I believe, that with proper planning, Alaska can be made to act as a small safety valve for meeting some of the unemployment of our own nationals.

"On account of high transportation costs and many other factors, the present mineral production from Alaska is chiefly the precious metals, gold and platinum. There are only a limited number of prospectors in Alaska today and their search is chiefly given over to the precious metals—that is what they have been searching for over the years, and a good gold mine or platinum mine is easy to sell.

"Those of us who know something of the geology and mineral resources of Alaska are confident that many valuable other mineral deposits must be locked away in the mountain ranges of this vast territory. I have in mind not only base metals but the great range of non-metallic minerals which do not have bright metallic faces to glitter in the sunlight and thus catch the eye of the prospector. With the vast new electric power development in the Pacific Northwest there will be increased demands for deposits of such minerals in the Pacific Northwest and in Alaska.

"If during the next few years we should again face the problem of national unemployment on a grand scale, why not then select several thousand men who would be fitted for prospecting in Alaska and with this army of men (Americans, not non-quota aliens) carry out a carefully planned searching inventory of the mineral resources of Alaska? Such a project, if properly conceived and executed, would certainly result in many new mineral discoveries. Some of these, obviously, would not be of immediate commercial importance but we would then have them inventoried against future demands.

"It wouldn't be very fruitful suddenly to dump several thousand inexperienced and poorly selected men into the hills of Alaska. Many of them would get lost the first day out of camp. The whole plan would have to be carefully worked out by men experienced in the mining industry and men who understand the problems of Alaska. My point is that it would be helpful to start that long-range planning now so that when the time comes the framework of the plan will be ready. The mining men of the territory are not the selfish group of rugged individualists as sometimes painted by the politicians. If they thought there was merit in this suggestion, I am sure that there are many responsible men in the territory who would give their time and energy to the planning without any personal remuneration.

"I have never talked to an Alaskan yet who was in favor of cluttering up our last geographic frontier with thousands of non-quota aliens. Isn't there some merit in the idea that we should save this frontier as a small safety valve to meet future economic pressure from within our own nation?

"Sincerely,
"ERNEST N. PATTY, *Manager*,
"Alluvial Golds, Inc.,
"Fairbanks, Alaska."

Limited Work Resumed at Tyrone Mine

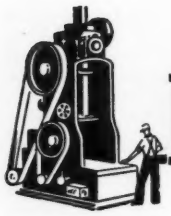
Philip R. Lynch, resident manager of the Burro Mountain branch of the Phelps Dodge Corporation at Tyrone, N. Mex., has announced that mining activity on a limited scale will be resumed at that mine. He said:

"Preliminary planning and investigation work will commence immediately in connection with proposed plans to leach Tyrone ore in place. Results attained from this investigation and experimental work will determine the amount of work that will be done in the future at Tyrone. Only a small crew of men will be employed to carry on this work."

New Mine Starts Shipping

In May the Princess-Elkhorn Company started shipping from their new mine recently opened near West Prestonsburg, Ky. Shipments were started on completion of a branch line by the Chesapeake & Ohio Railroad, costing $780,000.

The Princess-Elkhorn Company was incorporated last year, with Harry LaViers, of Paintsville, Ky., as president. It is operating on a lease of 3,000 acres and the mine will be completely mechanized.



MANUFACTURERS' Forum

Rubber-Tread Return Idler For Belt Conveyors

The development and manufacture of a new line of rubber-tread idlers for supporting the return run of 14- to 60-in. wide belt conveyors is announced by Link-Belt Co., 220 South Belmont Ave., Indianapolis, Ind.

Each complete idler consists of from 4 to 12 6-in. diameter rubber-tired rolls suitably spaced and mounted on

a Friction Fighter roller-bearing-equipped steel tube that will fit into the same supporting hangers as the regular Link-Belt return idler roll.

The individual rolls consist of a renewable extruded rubber tire clamped between two steel discs firmly held together by three round-head bolts. As the rubber tire is made split, it can readily be replaced with a new tire when required, by just removing three nuts, instead of having to strip the entire unit and other rolls off the tube, which would be necessary if the rolls had tires that were made endless.

The new idlers are especially recommended for conveyors handling corrosive, abrasive, wet, or sticky materials, such as salt, coke, phosphate rock, fertilizers, wet coal, etc., because (1) there is only a rubber-to-rubber contact between return idler and the underside of conveyor belt, and (2) as the kneading action of the rubber treads keeps the material from building up, also helping to break up and loosen ice forming on the belt in freezing weather.

A copy of new Folder A-640, giving sizes, dimensions, list prices, is available to any interested reader upon request addressed to the manufacturer, or to the Journal.

Hardinge Hydro Classifier

Some noteworthy improvements have recently been made in the Hardinge hydro classifier. Several installations of this machine have been made during the past year by the Hardinge Co., York, Pa., for classifying operations, particularly in sand washing plants for washing sand free of included clay and micron sizes of sand.

The hydro classifier consists of a circular steel tank divided into two compartments, a main or upper one equipped with an adjustable overflow weir in which agitating and collecting spiral rakes operate and a conical-shaped lower one where a final wash is given the product being made.

The simple means now used permits making various sizes of products on one machine by varying the volume available for retention and at the same time the settling out period in it. This is accomplished by using a telescopic type peripheral weir, which permits varying the classified depth from a maximum operating depth of one-half of its maximum, or at any in-between point. A sand product may be made varying anywhere from practically all plus 80-mesh to practically all plus 240-mesh by this arrangement. Extremely fine material is removed as an overflow product.

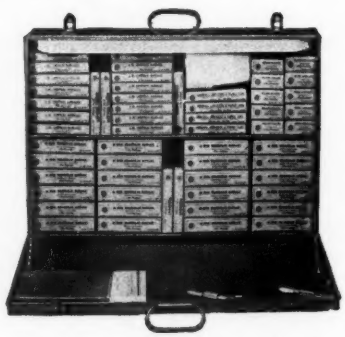
Another interesting feature of the hydro classifier is the sand-cleaning chamber below the raking section, where water enters tangentially, gives a swirling action to the sand, and removes the last traces of included fines or silt.

The machine is operated by a motor through an enclosed oil-lubricated drive gear and includes the Hardinge "auto-raise" feature to prevent damage from sudden overloads.

Power requirements are small, a 1½-hp. motor being sufficient to operate a 20-ft. dia. classifier.

First Aid Cabinet

A new miner's first-aid cabinet has been announced by the Mine Safety Appliances Company, Pittsburgh, Pa. The cabinet provides a complete assortment of first-aid materials for the mine emergency hospital and dressing



station. Included in the cabinet are the complete revised lists specified in the (1940 Edition) Manual of First Aid Instructions, published by the U. S. Bureau of Mines. First-aid materials contained in the kit include triangular and compress bandages, adhesive compresses, sterile gauze, picric acid gauze, ammonia ampoules and inhalants, tourniquets, paper cups, bandage scissors, splinter forceps, splints and the Manual of First Aid Instructions. Bandages and ampoule products are put up in handy individual packages, plainly marked and easily removed. The handy cabinet can be hung on the wall out of the way. The lid is equipped with chains so that, when opened, it serves as a work shelf on which to lay out dressings.

Complete details on the new cabinet may be secured by writing this publication or direct to Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh, Pa. Ask for Bulletin No. FA-74.

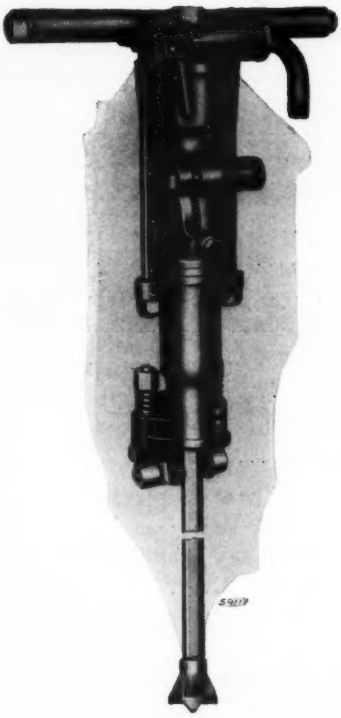
Stoker Crushers With Reversible Ratchet Adjustment

To provide quick, easy adjustment of roll spacing, a reversible ratchet adjustment is now incorporated as standard equipment on all 24-in. and 36-in. diameter stoker coal crushers manufactured by the McNally-Pittsburg Mfg. Corp., Chicago, Ill. The ratchet adjustment is applied to one of the adjustment screws and coupled through to the adjustment screw on the opposite end of the roll by roller chain and sprockets. This insures an absolutely equal adjustment at both ends of the roll and makes for perfect sizing. An indicator is provided which shows the exact distance of roll movement, and eliminates the need for motorized adjustment.

Double roll crushers are usually manufactured with separate adjustment screws on each side of the machine frame for the adjustment of the crushing roll. This method makes the roll adjustment more or less a time consuming element; there is also a tendency in this method, through hasty adjustment, of bringing the rolls closer at one end than the other. Rolls incorporating this new feature may be adjusted in a few seconds, even while the crusher is in operation. Further information may be had by addressing the company at 307 N. Michigan Ave., Chicago, Ill.

The "Easy-Holding" JB-5 Jackhamer Drill

A new 55-pound Jackhamer Rock Drill has been introduced by the Ingersoll-Rand Company, Phillipsburg, N. J., which the company designates as the "Easy-Holding" JB-5. It is claimed that because of many new features incorporated in this drill the machine is much easier on the oper-



ator and, consequently, permits greater output on the average drilling job.

One of the chief reasons for reduced vibration is a refined valve action, which action also results in more economical use of compressed air. Another new feature, which has received many favorable comments from operators, is an easy opening, long life steel holder which greatly reduces the time and effort in changing drill steels. This holder is either hand or foot operated, eliminating bending over.

Other features include a drop forged blower valve handle, large exhaust opening, two-piece chuck, thicker cylinder walls, and large bearing surfaces within the drill. The lubrication is exceptionally positive and thorough.

The company has issued a new illustrated booklet, Form 2734, which gives many interesting particulars of this Jackhamer. Copies can be secured from the Ingersoll-Rand Company, 11 Broadway, N. Y.

Trumbull Motor Control Centers

The Trumbull Electric Mfg. Company, Plainville, Conn., recently announced a new line of motor control centers, representing an assorted assembly of sizes 1, 2, or 3 combination magnetic starter units of standardized width in vertical section troughs, in which power is supplied through bus bars.

These assemblies may be located in one central point, or if complete centralization of all starting units is not feasible, these larger centers may be divided into smaller sections and distributed as is most convenient for the machine layout. Immediate connection is made between motor control center and the load by simply inserting the starting units, which are equipped with stabs, onto the bus bars in the power trough. These assemblies provide great flexibility, convertibility and all interior parts are completely accessible from the front. These centers are illustrated and described in Circular No. 331 which will be sent upon request to the company.

New Trailing Cable Connection Plug

The Ohio Brass Company, Mansfield, Ohio, announces development of a new trailing cable connection plug for 80-ampere loads. The new plug, designated as the 80-ampere Mechano-Plug, accommodating a 3-conductor cable of No. 6 or smaller sizes of wire.

The new plug is of the flat-type design and eliminates the necessity of makeshift cable splices or vulcanizing. A double locking arrangement holds the two halves of the plug in positive engagement, preventing inadvertent separation by cable strain or dragging equipment. Non-corrosive plugs are so arranged as to prevent improper polarity in making connections. All joints of the male and female rubber plug bodies are moisture and dust-proof, insuring a positive leak-proof electrical connection at all times. The insulated rubber body protects man and device from the possibility of electric shock or mechanical strain and impact.

Wagon Drill Announced

A new wagon drill, Type G-500, has been announced by the Chicago Pneumatic Tool Company, 6 East 44th Street, New York City. They are especially designed for deep hole drilling, up to 40 ft., and are adapted for any class of rock excavation where steel changes in excess of 36 in. are practicable, and large diameter holes are effective. The tubular steel base can readily be converted from wheel to skid mounting. The features of the machine as pointed out by the company are: it has quick fortability; the drill is fed to the work by gravity and raising is by means of a hoist, either air or hand. Labor and fatigue are thus reduced to a minimum. The tower is tilting and adjustable and is operated by a hand crank that permits quick and easy adjustment from 25 degrees either side of vertical, in addition to a lateral adjustment of 7½ degrees either side of vertical to facilitate angle drilling and compensate for rough and sloping surfaces. The rear wheels of the G-500 can be quickly and easily turned at right angles for line drilling or broaching and to facilitate working close to bank or wall.

CP drifters of any type suitable for the formation or depth of hole may be readily mounted on this wagon drill. It is recommended, however, that the 4-in. CP-70 drifter be used for practically all conditions because of its exceptional drilling speed, strength of rotation and hole-cleaning capacity. Further information may be obtained from the company.

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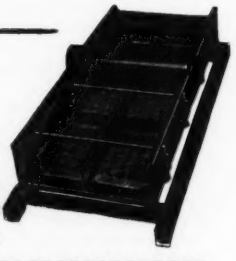

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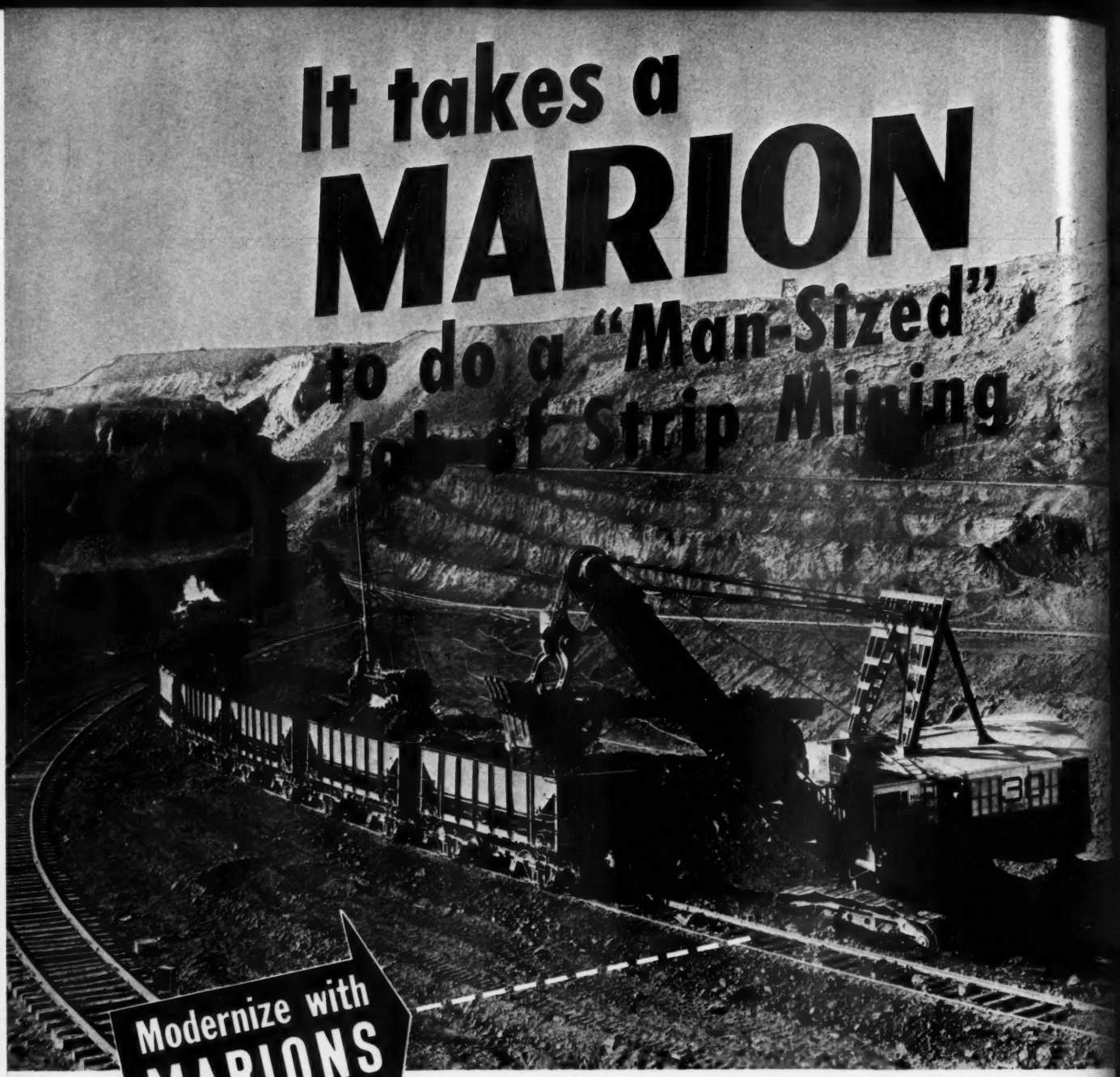

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